## SPEC CPU®2017 Integer Rate Result

**Inspur Electronic Information Industry Co., Ltd. (IEI)**

**NF5280M7 (Intel Xeon Gold 6454S)**

### CPU2017 License: 3358

**Test Sponsor:** Inspur Electronic Information Industry Co., Ltd. (IEI)

**Tested by:** Inspur Electronic Information Industry Co., Ltd. (IEI)

**Test Date:** Mar-2023

**Hardware Availability:** Apr-2023

**Software Availability:** Feb-2023

### SPECrate®2017_int_base = 563

**SPECrate®2017_int_peak = 580**

### Hardware

**CPU Name:** Intel Xeon Gold 6454S  
**Max MHz:** 3400  
**Nominal:** 2200  
**Enabled:** 64 cores, 2 chips, 2 threads/core  
**Orderable:** 1.2 chips  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**L2:** 2 MB I+D on chip per core  
**L3:** 60 MB I+D on chip per chip  
**Other:** None  
**Memory:** 512 GB (16 x 32 GB 2Rx4 PC5-4800B-R)  
**Storage:** 1 x 1 TB NVME SSD  
**Other:** None

### Software

**OS:** Red Hat Enterprise Linux 9.0 (Plow)  
**5.14.0-70.22.1.el9_0.x86_64**

**Compiler:**  
C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;  
Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;

**Parallel:** No

**Firmware:** Version 03.01.00 released Dec-2022

**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.

### SPECrate®2017_int_base (563)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
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**SPECrate®2017_int_peak (580)**
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**Software Availability:** Feb-2023

### Results Table

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</table>

**SPECrate®2017_int_base = 563**  
**SPECrate®2017_int_peak = 580**

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

### Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalanchmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

### 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/CPU2017/lib/intel64:/home/CPU2017/lib/ia32:/home/CPU2017/je5.0.1-32"  
MALLOC_CONF = "retain:true"
General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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>

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

Platform Notes

BIOS configuration:
ENERGY_PERF_BIAS_CFG mode set to Performance
Hardware Prefetch set to Disable
VT Support set to Disable
Sub NUMA Cluster (SNC) set to SNC4

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Thu Mar 16 15:32:06 2023

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

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1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.e19_0)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/klugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode

(Continued on next page)
Platform Notes (Continued)

23. BIOS
-----------------------------------------------

1. uname -a
   Linux localhost.localdomain 5.14.0-70.22.1.el9_0.x86_64 #1 SMP PREEMPT Tue Aug 2 10:02:12 EDT 2022 x86_64 x86_64 GNU/Linux

2. w
   15:32:06 up 36 min, 1 user, load average: 0.08, 1.90, 2.73
   USER   TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root   tty1      14:55    7.00s  1.05s  0.01s -bash

3. Username
   From environment variable $USER: root

4. ulimit -a
   real-time non-blocking time (microseconds, -R) unlimited
   core file size (blocks, -c) 0
   data seg size (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size (blocks, -f) unlimited
   pending signals (-i) 2062183
   max locked memory (kbytes, -l) 64
   max memory size (kbytes, -m) unlimited
   open files (-n) 1024
   pipe size (512 bytes, -p) 8
   POSIX message queues (bytes, -q) 819200
   real-time priority (-r) 0
   stack size (kbytes, -s) unlimited
   cpu time (seconds, -t) unlimited
   max user processes (-u) 2062183
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 18
   login -- root
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak -o all intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
   --runmode rate --tune base:peak --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
   specperl1 $SPEC/bin/sysinfo
   $SPEC = /home/CPU2017

6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Gold 6454S
   vendor_id : GenuineIntel
   cpu family : 6

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### Platform Notes (Continued)

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<tr>
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<td>32</td>
</tr>
<tr>
<td>siblings</td>
<td>64</td>
</tr>
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</table>

2 physical ids (chips)

128 processors (hardware threads)

physical id 0: core ids 0-31

physical id 1: core ids 0-31

physical id 0: apic ids 0-63

physical id 1: apic ids 128-191

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

---

7. lscpu

From lscpu from util-linux 2.37.4:

```
Architecture:                    x86_64
CPU op-mode(s):                  32-bit, 64-bit
Address sizes:                   46 bits physical, 57 bits virtual
Byte Order:                      Little Endian
CPU(s):                          128
On-line CPU(s) list:             0-127
Vendor ID:                       GenuineIntel
BIOS Vendor ID:                  Intel(R) Corporation
Model name:                      Intel(R) Xeon(R) Gold 6454S
BIOS Model name:                 Intel(R) Xeon(R) Gold 6454S
CPU family:                      6
Model:                           143
Thread(s) per core:              2
Core(s) per socket:              32
Socket(s):                       2
Stepping:                        6
CPU max MHz:                     3400.000
CPU min MHz:                     800.000
BogoMIPS:                        4400.00
```

Flags:

```
fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
clflush dct acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc cpuid aperfmperf tsc_know_freq pni pclmulqdq dtes64 monitor
des cpl smx est tm2 ssse3 sse4_1 fma cx16 xtpr pdcm pcid dca sse4_2
x2apic msr a20_m Mash va_mce vaپm vaپmsse lbxpmsse de pbe intel_pstate
msr aarch64 fspr msr aarch64_lm cpuid_fault ebpx cat_l3 cat_l2 cat_l1
cpu_l1_dcache_size=256 KiB cpu_l2_dcache_size=512 KiB cpu_l3_dcache_size=4 MiB
cpu_l3_dcache_latency=360 CPU cores=32 physical_id=0 core_ids=0-31
physical_id=1 core_ids=32-63
physical_id=0 apic_ids=0-63
physical_id=1 apic_ids=128-191
```

---

```
NUMA node(s):        8
L1d cache:           3 MiB (64 instances)
L1i cache:           2 MiB (64 instances)
L2 cache:            128 MiB (64 instances)
L3 cache:            120 MiB (2 instances)
```

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Platform Notes (Continued)

NUMA node0 CPU(s): 0-7,64-71
NUMA node1 CPU(s): 8-15,72-79
NUMA node2 CPU(s): 16-23,80-87
NUMA node3 CPU(s): 24-31,88-95
NUMA node4 CPU(s): 32-39,96-103
NUMA node5 CPU(s): 40-47,104-111
NUMA node6 CPU(s): 48-55,112-119
NUMA node7 CPU(s): 56-63,120-127

Vulnerability Itlb multihit: Not affected
Vulnerability L1t: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 48K 12 Data 1 64 1 64
L1i 32K 32K 8 Instruction 1 64 1 64
L2 2M 128M 16 Unified 2 2048 1 64
L3 60M 120M 15 Unified 3 65536 1 64

node distances:
node 0 1 2 3 4 5 6 7
0: 10 12 12 12 21 21 21
1: 12 10 12 12 21 21 21
2: 12 12 10 12 21 21 21
3: 12 12 12 10 21 21 21
4: 21 21 21 21 10 12 12

(Continued on next page)
Platform Notes (Continued)

9. /proc/meminfo
MemTotal: 527959956 kB

10. who -r
run-level 3 Mar 16 14:55

11. Systemd service manager version: systemd 250 (250-6.el9_0)
Default Target: multi-user
Status: degraded

12. Failed units, from systemctl list-units --state=failed
* NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online

13. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond ddbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode nss-domainname rsyslog selinux-autorelabel-mark sshd sssd systemd-network-generator udisks2 upower
enabled-runtime systemd-remount-fs
indirect sssd-autofs sssd-kcm sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sssd

14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.22.1.el9_0.x86_64
root=/dev/mapper/rhel-root
ro
disk=noprefetch
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap

15. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 3.40 GHz.
The governor "performance" may decide which speed to use
within this range.
boost state support:
Supported: yes
Active: yes

16. sysctl
kernel numa_balancing 1
kernel.randomize_va_space 2

(Continued on next page)
Platform Notes (Continued)

vm.compaction_proactiveness        20
vm.dirty_background_bytes           0
vm.dirty_background_ratio          10
vm.dirty_bytes                      0
vm.dirty_expire_centisecs        3000
vm.dirty_ratio                     20
vm.dirty_writeback_centisecs      500
vm.dirtytime_expire_seconds     43200
vm.extfrag_threshold            500
vm.min_unmapped_ratio             3
vm.nr_hugepages                   0
vm.nr_hugepages_mempolicy        0
vm.nr_overcommit_hugepages        0
vm.swappiness                      60
vm.watermark_boost_factor        15000
vm.watermark_scale_factor         10
vm.zone_reclaim_mode              0

17. /sys/kernel/mm/transparent_hugepage
    defrag always defer defer+madvice [madvice] never
    enabled [always] madvice never
    hpage_pmd_size 2097152
    shmem_enabled always within_size advise [never] deny force

18. /sys/kernel/mm/transparent_hugepage/khugepaged
    alloc_sleep_millisecs 60000
    defrag 1
    max_ptes_none 511
    max_ptes_shared 256
    max_ptes_swap 64
    pages_to_scan 4096
    scan_sleep_millisecs 10000

19. OS release
    From /etc/*-release /etc/*-version
    os-release Red Hat Enterprise Linux 9.0 (Plow)
    redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
    system-release Red Hat Enterprise Linux release 9.0 (Plow)

20. Disk information
    SPEC is set to: /home/CPU2017
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs 819G 87G 732G 11% /home

21. /sys/devices/virtual/dmi/id
    Vendor: Inspur
    Product: NF5280M7
    Product Family: Not specified
    Serial: 21A951643

22. dmidecode
    Additional information from dmidecode 3.3 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

(Continued on next page)
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Software Availability: Feb-2023

Platform Notes (Continued)

"DMTF SMBIOS" standard.
Memory:
16x Samsung M321R4GA3BB6-CQKVG 32 GB 2 rank 4800

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 03.01.00
BIOS Date: 12/29/2022

Compiler Version Notes

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<th>502.gcc_r(peak)</th>
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<tbody>
<tr>
<td></td>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201</td>
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<tr>
<td></td>
<td>Copyright (C) 1985-2022 Intel Corporation. All rights reserved.</td>
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<th>C++</th>
<th>520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201</td>
</tr>
<tr>
<td></td>
<td>Copyright (C) 1985-2022 Intel Corporation. All rights reserved.</td>
</tr>
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<table>
<thead>
<tr>
<th>Fortran</th>
<th>548.exchange2_r(base, peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201</td>
</tr>
<tr>
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</tr>
</tbody>
</table>
## SPEC CPU®2017 Integer Rate Result

**Inspur Electronic Information Industry Co., Ltd. (IEI)**

**NF5280M7 (Intel Xeon Gold 6454S)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>563</td>
<td>580</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3358  
**Test Sponsor:** Inspur Electronic Information Industry Co., Ltd. (IEI)  
**Tested by:** Inspur Electronic Information Industry Co., Ltd. (IEI)

**Test Date:** Mar-2023  
**Hardware Availability:** Apr-2023  
**Software Availability:** Feb-2023

### Base Compiler Invocation

**C benchmarks:**
- icx

**C++ benchmarks:**
- icpx

**Fortran benchmarks:**
- ifx

### Base Portability Flags

- perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
- gcc_r: `-DSPEC_LP64`
- mcf_r: `-DSPEC_LP64`
- omnetpp_r: `-DSPEC_LP64`
- xalancbmk_r: `-DSPEC_LP64 -DSPEC_LINUX`
- x264_r: `-DSPEC_LP64`
- deepsjeng_r: `-DSPEC_LP64`
- leela_r: `-DSPEC_LP64`
- exchange2_r: `-DSPEC_LP64`
- xz_r: `-DSPEC_LP64`

### Base Optimization Flags

**C benchmarks:**
- `-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`  
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

**C++ benchmarks:**
- `-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`  
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

**Fortran benchmarks:**
- `-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto`  
- `-lqkmalloc`
## Peak Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifx

## 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`

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

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**Inspur Electronic Information Industry Co., Ltd. (IEI)**

**NF5280M7 (Intel Xeon Gold 6454S)**

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**SPECrate®2017_int_base = 563**

**SPECrate®2017_int_peak = 580**

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**CPU2017 License:** 3358

**Test Date:** Mar-2023

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**Hardware Availability:** Apr-2023

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**Test Sponsor:** Inspur Electronic Information Industry Co., Ltd. (IEI)

**Software Availability:** Feb-2023

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**Tested by:** Inspur Electronic Information Industry Co., Ltd. (IEI)

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**Peak Optimization Flags (Continued)**

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -fto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fno-alias

-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin -lqkmalloc

557.xz_r: basepeak = yes

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-ic2023-official-linux64.html


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

http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.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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