Vehicle Emission Standards

Japan
Japan Pre-JLEV Light-Duty Emission Standards
11 Mode Cold Start Test

- This chart summarizes the pre-JLEV Japanese emission standards for gasoline passenger cars based on the 11-mode cold-start driving cycle (see chart under test cycles for a description of this driving cycle). Diesel passenger cars are not currently regulated for cold-start emission performance.
Japan Pre-JLEV Light-Duty Emission Standards
11 Mode Cold Start Test

Emissions, g/test

Gasoline Only

HC CO/10 NOx
JLEV Gasoline Light-Duty Standards
11 Mode Cold Start Test

- This chart compares Japan’s pre-JLEV gasoline passenger car standards with the year 2000 gasoline standards (so called JLEV standards) for the 11 mode cold-start driving cycle (see chart under test cycles for a description of this test cycle). The JLEV emission standards include a NMHC limit rather than the THC limit used in previous regulations. These JLEV standards were introduced in October 2000.
JLEV Gasoline Light-Duty Standards
11 Mode Cold Start Test

Emissions, g/test

Pre-JLEV stds. | JLEV-10/2000 start
---|---
HC | 7.0 | 2.2
CO/10 | 6.0 | 1.9
NOx | 4.4 | 1.4

JLEV standard based on NMHC not THC
Japan Pre-JLEV Light-Duty Emission Standards
10-15 Mode Hot Start Test

This chart summarizes the pre-JLEV Japanese emission standards for gasoline and diesel light-duty vehicles (passenger cars and light-duty trucks) based on the 10-15 mode hot-start driving cycle (see chart under test cycles for a description of this driving cycle). Diesel light-duty standards include limits on particulate matter (PM). With respect to light-duty trucks these standards apply to vehicles up to 1700 kg in weight.
Japan Pre-JLEV Light-Duty Emission Standards 10-15 Mode Hot Start Test

Emissions, g/km

<table>
<thead>
<tr>
<th></th>
<th>HC</th>
<th>CO/10</th>
<th>NOx</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>0.25 &lt;br&gt; 0.21 &lt;br&gt; 0.25</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td>0.40</td>
<td>0.21</td>
<td>0.40</td>
<td>0.08</td>
</tr>
</tbody>
</table>
This chart compares Japan’s pre-JLEV gasoline passenger car standards with the year 2000 gasoline standards (so called JLEV standards) for the 10-15 mode hot start driving cycle (see chart under test cycles for a description of this test cycle). The JLEV emission standards include a NMHC limit rather than the THC limit used in previous regulations. These JLEV standards were introduced in October 2000.
JLEV Gasoline Light-Duty Standards
10-15 Mode Hot Start Test

Emissions, g/km

<table>
<thead>
<tr>
<th></th>
<th>Pre-JLEV stds.</th>
<th>JLEV-10/2000 start</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>0.25</td>
<td>0.08</td>
</tr>
<tr>
<td>CO/10</td>
<td>0.210</td>
<td>0.08</td>
</tr>
<tr>
<td>NOx</td>
<td>0.25</td>
<td>0.067</td>
</tr>
</tbody>
</table>

JLEV standard based on NMHC not THC
The Japanese Environment Agency has finalized emission standards for light-duty gasoline vehicles that began in 2005. These 2005 light-duty gasoline standards are summarized in this chart. Starting in 2005 the light-duty gasoline vehicle emission standards will be based on a weighted average of emissions obtained from both the 11 mode cold start test and the 10-15 mode hot start test (see test cycles for details on the Japanese 11 mode and 10-15 mode driving cycles). In 2005 the emission standard includes 12% weighting of the 11 mode cold start test and 88% weighting of the 10-15 mode hot start test. The 2005 emission limits are compared here to the 2000 emission limits based on the 2005 weighting factors for each test cycle. These 2005 light-duty gasoline standards apply to all gasoline powered light-duty vehicles with inertia weights up to 1700 kg.
2005 Japan Gasoline Light-Duty Standards with weighted 11 Mode + 10-15 Mode Drive Cycle

Emissions, g/km

2005 Regulation: 12% weighting of 11 mode cold test + 88% weighting of 10-15 mode hot test
The Japanese Environment Agency has finalized emission standards for light-duty gasoline vehicles that are targeted to begin in 2008 and 2011. Starting in 2008 the light-duty gasoline vehicle emission standards will be based on a weighted average of emissions obtained from both a new cold start test cycle (Japan’s CD-32 drive cycle) and the existing 10-15 mode hot start test (see test cycles for details on the Japanese CD-32 and 10-15 mode driving cycles). In 2008 the emission standards increase the weighting of the cold start test to 25% (using the CD-32 drive cycle), with 75% weighting of the 10-15 mode hot start test. The 2008 emission limits are compared here to the 2000 emission limits based on the 2008 weighting factors for the appropriate cold and hot test cycles. In 2011 the new CD-32 test cycle replaces the 10-15 mode cycle for measuring hot start emissions. The weighting factors remain the same with 25% contribution from the cold start test and 75% contribution from the hot start test cycle (CD-32 drive cycle used for both cold and hot start emission measurements). These 2008/2011 light-duty gasoline standards apply to all gasoline powered passenger cars and light-duty trucks with inertia weights up to 1700 kg.
2008 and 2011 Japan Gasoline Light-Duty Standards with weighted Cold and Hot Drive Cycle

Emissions, g/km

- **NMHC**
- **CO/10**
- **NOx**

2000 Regulation (with 2008 weighting):
- NMHC: 0.19
- CO/10: 0.167
- NOx: 0.15

2008/2011 Regulation:
- NMHC: 0.05
- CO/10: 0.115
- NOx: 0.05

2008 Regulation: 25% weighting of new CD-32 mode cold cycle + 75% weighting of 10-15 mode hot cycle

2011: CD-32 hot cycle replaces 10-15 mode hot cycle with 2008 weighting
This chart summarizes the pre-JLEV Japanese emission standards for gasoline light-duty trucks based on the 11 mode cold-start driving cycle (see chart under test cycles for a description of this driving cycle). Standards are included for three light-duty truck categories for vehicle weights up to 2500 kg.
Japan Pre-JLEV Gasoline Truck Standards
11 Mode Cold Start Test

Emissions, g/km

- **Mini Trucks** (engine<0.66 liters):
  - HC: 7.0 g/km
  - CO/10: 4.4 g/km
  - NOx: 4.4 g/km

- **Small Trucks** (<1.7 tons):
  - HC: 7.0 g/km
  - CO/10: 6.0 g/km
  - NOx: 4.4 g/km

- **Medium Trucks** (1.7-2.5 tons):
  - HC: 7.0 g/km
  - CO/10: 7.0 g/km
  - NOx: 5.0 g/km
This chart summarizes the Japanese JLEV emission standards for gasoline light-duty trucks based on the 11 mode cold-start driving cycle (see chart under test cycles for a description of this driving cycle). Standards are included for three light-duty truck categories for vehicle weights up to 3500 kg. Note that these JLEV standards extend the upper weight class up to 3500 kg from the previous standards upper weight limit of 2500 kg. Phase-in of these JLEV standards began in October 2000.
Japan JLEV Gasoline Light-duty Truck Standards
11 Mode Cold Start Test - 2000 Phase-in

Emissions, g/km

- **HC**
- **CO/10**
- **NOx**

**Mini Trucks** (engine<0.66 liters)
- **HC**: 3.5
- **CO/10**: 3.8
- **NOx**: 2.2

**Small Trucks** (<1.7 tons)
- **HC**: 2.2
- **CO/10**: 2.2
- **NOx**: 1.9

**Medium Trucks** (1.7-3.5 tons)
- **HC**: 2.2
- **CO/10**: 2.4
- **NOx**: 1.6
Japan Pre-JLEV Gasoline Light-duty Truck Standards
10-15 Mode Hot Start Test

This chart summarizes the pre-JLEV Japanese emission standards for gasoline light-duty trucks based on the 10-15 mode hot-start driving cycle (see chart under test cycles for a description of this driving cycle). Standards are included for three light-duty truck categories for vehicle weights up to 2500 kg.
Japan Pre-JLEV Gasoline Light-duty Truck Standards
10-15 Mode Hot Start Test

**Emissions, g/km**

![Emissions Chart]

<table>
<thead>
<tr>
<th></th>
<th>Mini Trucks (engine&lt;0.66 liters)</th>
<th>Small Trucks (&lt;1.7 tons)</th>
<th>Medium Trucks (1.7-2.5 tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HC</strong></td>
<td>0.25</td>
<td>0.21</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>CO/10</strong></td>
<td>0.65</td>
<td>0.25</td>
<td>0.65</td>
</tr>
<tr>
<td><strong>NOx</strong></td>
<td></td>
<td></td>
<td>0.40</td>
</tr>
</tbody>
</table>
This chart summarizes the Japanese JLEV emission standards for gasoline light-duty trucks based on the 10-15 mode hot-start driving cycle (see chart under test cycles for a description of this driving cycle). Standards are included for three light-duty truck categories for vehicle weights up to 3500 kg. Note that these JLEV standards extend the upper weight class up to 3500 kg from the previous standards upper weight limit of 2500 kg. Phase-in of these JLEV standards began in October 2000.
Japan JLEV Gasoline Light-duty Truck Standards
10-15 Mode Hot Start Test - 2000 Phase-in

Emissions, g/km

- Mini Trucks (engine<0.66 liters)
  - HC: 0.13
  - CO/10: 0.330
  - NOx: 0.13

- Small Trucks (<1.7 tons)
  - HC: 0.08
  - CO/10: 0.067
  - NOx: 0.08

- Medium Trucks (1.7-3.5 tons)
  - HC: 0.08
  - CO/10: 0.210
  - NOx: 0.13
The Japanese Environment Agency has finalized emission standards for light-duty gasoline trucks that began in 2005 for two weight categories and in 2007 for mini-trucks. These 2005-2007 light-duty gasoline truck standards are summarized in this chart. Starting in 2005 the light-duty gasoline vehicle emission standards will be based on a weighted average of emissions obtained from both the 11 mode cold start test and the 10-15 mode hot start test (see test cycles for details on the Japanese 11 mode and 10-15 mode driving cycles). In 2005 the emission standard includes 12% weighting of the 11 mode cold start test and 88% weighting of the 10-15 mode hot start test.
2005-2007 Japan Gasoline Light-duty Truck Standards; weighted 11 Mode + 10-15 Mode Test Cycle

Emissions, g/km

- NMHC
- CO/10
- NOx

Mini Trucks (engine < 0.66 liters)
- 2007: 0.05
- 2005: 0.05

Small Trucks (< 1.7 tons)
- 2007: 0.402
- 2005: 0.115

Medium Trucks (1.7-3.5 tons)
- 2007: 0.255
- 2005: 0.07

2005 & 2007 Regulation: 12% weighting of 11 mode cold test + 88% weighting of 10-15 mode hot test
The Japanese Environment Agency has finalized emission standards for light-duty gasoline trucks that are targeted to begin in 2008 and 2011. Starting in 2008 the light-duty gasoline vehicle emission standards will be based on a weighted average of emissions obtained from both a new cold start test cycle (Japan’s CD-32 drive cycle) and the existing 10-15 mode hot start test (see test cycles for details on the Japanese CD-32 and 10-15 mode driving cycles). In 2008 the emission standards increase the weighting of the cold start test to 25% (using the CD-32 drive cycle), with 75% weighting of the 10-15 mode hot start test. In 2011 the new CD-32 test cycle replaces the 10-15 mode cycle for measuring hot start emissions. The weighting factors remain the same with 25% contribution from the cold start test and 75% contribution from the hot start test cycle (CD-32 drive cycle used for both cold and hot start emission measurements). The 2008 and 2011 emission limits remain the same as the 2005-2007 emission limits for light-duty gasoline trucks.
2008 & 2011 Japan Gasoline Light-duty Truck Standards with weighted Cold and Hot Drive Cycle

Emissions, g/km

2008 weighting: 0.25x new cycle cold test + 0.75x 10-15 mode hot test
2011 weighting: 0.25x new cycle cold test + 0.75x new cycle hot test
In order to encourage the introduction of cleaner vehicles than required by the gasoline JLEV standards (phase-in began in 2000), the Japanese Environment Agency issued guidelines for so called Low Emission Vehicles. This chart summarizes three categories established as a part of this voluntary program. Manufacturers can label their vehicles in one of these three categories if the certification emissions are the required percentage below the JLEV standards for HC and NOx. The government hopes that consumers will select such low emission vehicles because of their environmentally friendly emission performance. Starting in October 2003 only the top two categories will be available for use by OEMs (LEV and ELEV) in this voluntary low emission vehicle program. The percentage reductions in HC and NOx emissions required to receive these special vehicle designations must also use the 2005 Japanese gasoline vehicle emission standards as the baseline rather than the JLEV standards.
Japan Voluntary Gasoline Low Emission Vehicle Program

% Reduction in Emissions

- TLEV
- LEV
- ELEV

HC
NOx

0 25 50 75 100

MECA World Regulations
Japan Light-Duty Diesel Truck & Bus Standards
10-15 Mode Hot Start Test (1.7<GVW<2.5 tons)

- Previous Japanese standards for diesel trucks and buses with GVW between 1700 and 2500 kg. are summarized in this chart. These standards apply to the the Japanese 10-15 mode hot-start driving cycle (see test cycles section for details on the 10-15 mode driving cycle). Standards for diesel vehicles include a standard for particulate matter (PM).
Japan Light-Duty Diesel Truck & Bus Standards
10-15 Mode Hot Start Test (1.7<GVW<2.5 tons)

Emissions, g/km

- HC
- CO/10
- NOx
- PM

Diesel Light-duty Trucks & Buses
(1.7<GVW<2.5 tons)
The Japanese Environment Agency established new emission standards for light-duty diesel vehicles beginning in 2002. These standards are summarized above for passenger cars, small trucks, and medium trucks. These standards reduce levels of all regulated pollutants compared to existing diesel emission standards for the 10-15 mode hot start test (see test cycles for details on the Japanese 10-15 mode driving cycle). These 2002 standards were phased-in over the 2002-2003 timeframe.
2002 Japan Light-Duty Diesel Standards
10-15 Mode Hot Start Test

Emissions, g/km

<table>
<thead>
<tr>
<th>Category</th>
<th>HC</th>
<th>CO/10</th>
<th>NOx</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Cars</td>
<td>0.12</td>
<td>0.063</td>
<td>0.12</td>
<td>0.060</td>
</tr>
<tr>
<td>Medium Cars</td>
<td>0.12</td>
<td>0.063</td>
<td>0.12</td>
<td>0.060</td>
</tr>
<tr>
<td>Small Trucks</td>
<td>0.12</td>
<td>0.063</td>
<td>0.12</td>
<td>0.060</td>
</tr>
<tr>
<td>Medium Trucks</td>
<td>0.12</td>
<td>0.063</td>
<td>0.12</td>
<td>0.060</td>
</tr>
</tbody>
</table>

Standards phased-in over 2002-2003
The Japanese Environment Agency has finalized emission standards for light-duty diesel vehicles that began in 2005 (originally targeted for 2007 but pulled forward to 2005). These 2005 passenger car and light-duty truck standards are summarized in this chart. These standards significantly reduce emissions of hydrocarbons, NOx and particulate matter (PM) compared to the 2002 light-duty diesel emission standards. Starting in 2005 the light-duty diesel vehicle emission standards will be based on a weighted average of emissions obtained from both the 11 mode cold start test and the 10-15 mode hot start test (see test cycles for details on the Japanese 11 mode and 10-15 mode driving cycles). In 2005 the emission standard includes 12% weighting of the 11 mode cold start test and 88% weighting of the 10-15 mode hot start test. The 2005 limits also include a limit on NMHC emissions rather than the THC limit used in the 2002 light-duty diesel regulations.
2005 Japan Light-Duty Diesel Standards weighted 11 Mode + 10-15 Mode Test Cycle

**Emissions, g/km**

<table>
<thead>
<tr>
<th></th>
<th>NMHC</th>
<th>CO/10</th>
<th>NOx</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Cars (GVW &lt; 1.7 tons)</td>
<td>0.024</td>
<td>0.063</td>
<td>0.013</td>
<td>0.14</td>
</tr>
<tr>
<td>Small Trucks (1.7 &lt; GVW &lt; 3.5 tons)</td>
<td>0.024</td>
<td>0.063</td>
<td>0.013</td>
<td>0.14</td>
</tr>
<tr>
<td>Medium Cars (1.7 &lt; GVW &lt; 3.5 tons)</td>
<td>0.024</td>
<td>0.063</td>
<td>0.014</td>
<td>0.15</td>
</tr>
<tr>
<td>Medium Trucks (GVW &lt; 1.7 tons)</td>
<td>0.024</td>
<td>0.063</td>
<td>0.014</td>
<td>0.15</td>
</tr>
</tbody>
</table>

2005 Regulation: 12% weighting of 11 mode cold test + 88% weighting of 10-15 mode hot test
The Japanese Environment Agency will begin the phase-in of the new Japanese Driving Cycle (see CD-32 cycle under Japanese test cycles) for light-duty diesel cars and trucks starting in 2008. Emission limits remain the same as the 2005 light-duty diesel standards but are measured with differing driving cycles in 2008 and 2011. In 2008 the cold start phase uses the new Japanese Driving Cycle instead of the 11 mode cold start test with the following weighting: (new cold start driving cycle) x 0.25 + (10-15 mode test) x 0.75. In 2011 the new Japanese Driving Cycle is used for both the cold start and hot start tests with emissions weighted as (new cold start driving cycle) x 0.25 + (new hot start driving cycle) x 0.75.

Emissions, g/km

2008 weighting: 0.25x new cycle cold test + 0.75x 10-15 mode hot test
2011 weighting: 0.25x new cycle cold test + 0.75x new cycle hot test
Japan Heavy-Duty Gasoline Truck Standards
Pre-JLEV Stds. vs. JLEV Stds.

- Pre-JLEV standards and JLEV standards for heavy-duty gasoline vehicles are summarized in this chart. Heavy-duty gasoline standards are measured using the European 13 mode engine cycle. The heavy-duty gasoline category applies to vehicles with GVW > 2500 kg in the case of the current standards, and GVW > 3500 kg for the JLEV standards. Phase-in of the new JLEV standards occurred in the 2001-2003 timeframe.
Japan Heavy-Duty Gasoline Truck Standards
Pre-JLEV Stds. vs. JLEV Stds.

Emissions measured using 13 mode engine cycle; applies to vehicles with GVW > 2.5 tons (current std.), > 3.5 tons (JLEV)
Japan Heavy-Duty Gasoline Truck Standards: 2005 vs. 2001

- 2005 standards and 2001 targets for heavy-duty gasoline vehicles are summarized in this chart. 2001 heavy-duty gasoline standards are measured using the European 13 mode steady-state engine cycle. Starting in 2005 Japan introduced a new transient emission engine cycle. Engines must meet the 2005 heavy-duty emission limits on this transient cycle and a steady-state engine test. The 2005 standards switch to a NMHC standard compared to the THC standard used in 2001. The 2001 and 2005 heavy-duty gasoline truck standards apply to vehicles with GVW > 3500 kg.
Japan Heavy-Duty Gasoline Truck Standards: 2005 vs. 2001

2003: measured using 13 mode engine cycle; applies to vehicles with GVW>3.5 tons; THC std.
2005: measured using new Japanese transient cycle + steady-state cycle; applies to vehicles with GVW>3.5 tons; NMHC std.
Japan Heavy-Duty Diesel Truck & Bus Standards: Previous vs. 2003

- Previous emission standards and 2003 targets for heavy-duty diesel vehicles are summarized in this chart. Heavy-duty diesel standards are measured using the European 13 mode steady-state engine cycle. The heavy-duty diesel truck and bus category applies to vehicles with GVW > 2500 kg. Phase-in of the new heavy-duty diesel emission standards began in 2003.
Japan Heavy-Duty Diesel Truck & Bus Standards: Previous vs. 2003

Emissions measured using 13 mode engine cycle; applies to vehicles with GVW>2.5 tons
Japan Heavy-Duty Diesel Truck & Bus Standards:
2009/2010 vs. 2005 vs. 2003

- 2009/2010, 2005 and 2003 standards for heavy-duty diesel vehicles are summarized in this chart. 2003 heavy-duty diesel standards are measured using the European 13 mode steady-state engine cycle. Starting in 2005 Japan introduced a new transient emission engine cycle. Engines must meet the 2005 heavy-duty emission limits on this transient cycle and a steady-state engine test. The 2005 heavy-duty diesel truck and bus category increases the minimum vehicle weight to vehicles with GVW > 3500 kg. The 2009/2010 standards must be implemented by the end of 2009 for vehicles with GVW > 12,000 kg and by the end of 2010 for vehicles with GVW of 3,500-12,000 kg.

Emissions, g/kWh


HC/10: 0.087 0.222 0.222
CO/10: 0.222 0.222 0.222
NOx/10: 0.180 0.200 0.200
PMEmissions, g/kWh: 0.017 0.027 0.070

2003: measured using 13 mode engine cycle; applies to vehicles with GVW>2.5 tons; THC std.
Japan 2007 Non-road Gasoline Standards

For the first time, starting in 2007, Japan will require emission standards for new non-road gasoline engines employed in non-road ("special purpose") applications. The standards apply to engines rated from 19 kW to engines with rated power up to (but not including) 560 kW. A new steady state test cycle is used to measure emissions from these engines.
Japan 2007 Non-road Gasoline Standards

Emissions, g/kWh

- HC
- CO/10
- NOx

Emissions measured using new steady-state engine cycle
This chart summarizes emission standards for non-road diesel vehicles (“special purpose diesel vehicles) introduced in Japan in 2003. The standards vary with rated engine power, with emissions measured using an 8 mode steady state test cycle.
Japan 2003 Non-road Diesel Standards

Emissions, g/kWh

- **HC**
- **CO/10**
- **NOx/10**
- **PM**

Emissions measured using 8 mode engine cycle
This chart summarizes emission standards for non-road diesel vehicles ("special purpose diesel vehicles") that begin their phase-in in Japan starting in 2006. The standards vary with rated engine power, with emissions measured using an 8 mode steady state test cycle. Implementation dates vary with rated engine power from 2006 through 2008.
Japan 2006-2008 Non-road Diesel Standards

Emissions, g/kWh

Emissions measured using 8 mode engine cycle
Gasoline and diesel fuel sulfur caps in Japan are shown in this chart. Although pre-2005 Japan gasoline fuel sulfur were set at a maximum of 100 ppm, actual gasoline fuel sulfur levels were in the 10-70 ppm range. A 50 ppm S cap on diesel fuel began in Japan in 2004. In late 2004 the Petroleum Association of Japan at the request of the Tokyo Metropolitan Government agreed to start the supply of 10 ppm max. S gasoline and diesel fuels into the Japanese domestic market beginning January 2005 (two years ahead of the 2007 mandatory requirement). All Japanese fuels were expected to be supplied at this ultra-low sulfur level by April 2005.
Japan Fuel Sulfur Limits

Max. Fuel S levels, ppm

- Pre-2004: 100 ppm Gasoline, 500 ppm Diesel
- 2004: 100 ppm Gasoline, 50 ppm Diesel
- April 2005: 10 ppm Gasoline, 10 ppm Diesel

MECA World Regulations
1998 Japan Motorcycle Emission Standards
Two & Four Stroke Engines

- Japan's emission standards for motorcycles are summarized in this chart for both two stroke and four stroke engines. These standards were put in place in October 1998 and include a four year phase-in. Motorcycle emission levels are measured in Japan using the ISO 6460 test cycle. No durability requirement is currently associated with these standards.
1998 Japan Motorcycle Emission Standards
Two & Four Stroke Engines

Emissions, g/km

Four stroke

Two stroke

Standards initiated 10/98 with 4 yr. phase-in
Emissions measured using ISO 6460 test cycle
2006-2007 Japan Motorcycle Emission Standards

Japan's 2006-2007 emission standards for motorcycles are summarized in this chart for all classes. These standards begin in 2006 for Class 1 and mini-sized motorcycles and in 2007 for Class 2 and small-sized motorcycles. With the introduction of these 2006-2007 motorcycle emission standards, emissions are measured using the ISO 6460 test cycle, including a cold-start.
2006-2007 Japan Motorcycle Emission Standards

Emissions measured using ISO 6460 test cycle; includes cold start
Japanese Driving Cycles

11 mode cold-start cycle

1. 11-mode Cycle

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>duration of cycle</td>
<td>120 s</td>
</tr>
<tr>
<td>distance per cycle</td>
<td>1.021 km</td>
</tr>
<tr>
<td>no. of cycles/test</td>
<td>4</td>
</tr>
<tr>
<td>total test time</td>
<td>505 s</td>
</tr>
<tr>
<td>total distance</td>
<td>4.084 km</td>
</tr>
<tr>
<td>average speed</td>
<td>30.6 km/h (39.1 km/h) *)</td>
</tr>
<tr>
<td>max. speed</td>
<td>60 km/h</td>
</tr>
</tbody>
</table>

*) without idle phases (idle time = 21.7%)

11-mode cold start test: The 11-mode cycle is to be run 4 times, measurements are taken in all 4 cycles. After cold start 25 s. idle. The transmission gears to be used are specified for 3- and 4-speed transmissions. For special transmissions the gear ratios to be used are specified individually; for automatic transmissions only position “Drive”. Exhaust emission analysis with CVS-system.
Japanese Driving Cycles
10-15 mode hot-start cycle

2. 10 • 15-mode Cycle

- Duration of cycle: 660 s
- Distance per cycle: 4.16 km
- No. of cycles/test: 1
- Average speed: 22.7 km/h (33.1 km/h) *)
- Max. speed: 70 km/h

*) without idle phases (idle time = 31.7%)

10 • 15-mode hot start test: Preconditioning 15 min. with 60 km/h, followed by 5 min. at 60 km/h and one 15-mode cycle. After the preconditioning the combined 10 • 15-mode (3 cycles 10-mode plus 1 cycle 15-mode) is to be run and measured once.
Japanese Driving Cycles
CD-32 drive cycle

Total test cycle time: 1223 seconds
Total drive cycle distance: 7.991 km
Maximum vehicle speed: 80 km/h

CD-32 drive cycle replaces 11 mode cold cycle test in 2008;
replaces 10-15 mode hot cycle test in 2011