



AV Road Safety Regime in South Korea

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1. Autonomous Driving Legislative Status

■ ■ ■ Autonomous Driving Regulation System

- Korean Autonomous Driving Regulation System is composed of
 - 1) Automobile Management Act
 - 2) Autonomous Vehicle Act
 - 3) Road Traffic Act

01 Automobile Management Act

- 1) **August 2015, Autonomous Driving is defined in:** “Motor Vehicle Management Act” (Article 2).
- 2) **Article 27 grants temporary operation to self driving vehicles**
 - Purpose of research in Autonomous Driving
 - Must meet Safety Regulation Requirements
- 3) **Automobile Management Act regulates granting and limiting technical requirements.**

2. Autonomous Driving Legislative Status

■ ■ ■ Autonomous Driving Regulation System

02 Autonomous Vehicle Act

- 1) “Acts to push and support the Autonomous Driving Vehicle’s distribution” has been implemented most recently (May of 2020).
- 2) Only possible at the pilot operation district
- 3) Currently 16 pilot operation districts around the country

03 Road Traffic Act

- 1) Road Traffic Act grants jurisdiction of autonomous driving in commercialization stage
- 2) By April 2022, distribution of Level 3 has been secured.
- 3) Driver must be able to take control when necessary for Level 3

2.1 Autonomous Driving Legislative Status

■ ■ ■ Road Traffic Act and Autonomous Driving

- **Road Traffic Act Article 50 Section 2 (Autonomous Driving Vehicles and Driver's Details of Compliance)**
 - ① Drivers of Vehicles with Autonomous Driving System must comply to the request of Autonomous Driving System to steering and brake device on their own.
 - ② While operating the vehicle by autonomous driving system, the 'prohibition of using a mobile phone while driving' and 'prohibition of watching videos while driving' regulations do not apply.

3 Autonomous Driving Vehicle's Authorization

■ ■ ■ Safety Certification System

- Self-Certification System was implemented in 2003.
 - 1) Automobile manufacturers must meet the requirements.
 - 2) Production scale, safety inspection facilities, performance test facilities.
 - 3) Production scale : One must produce annually over 2,500 vehicles or assemble over 500 vehicles annually that is of equivalency.
- Those that do not meet the requirements must undergo technical reviews and safety inspections by test agents.
 - Practical Type Approval

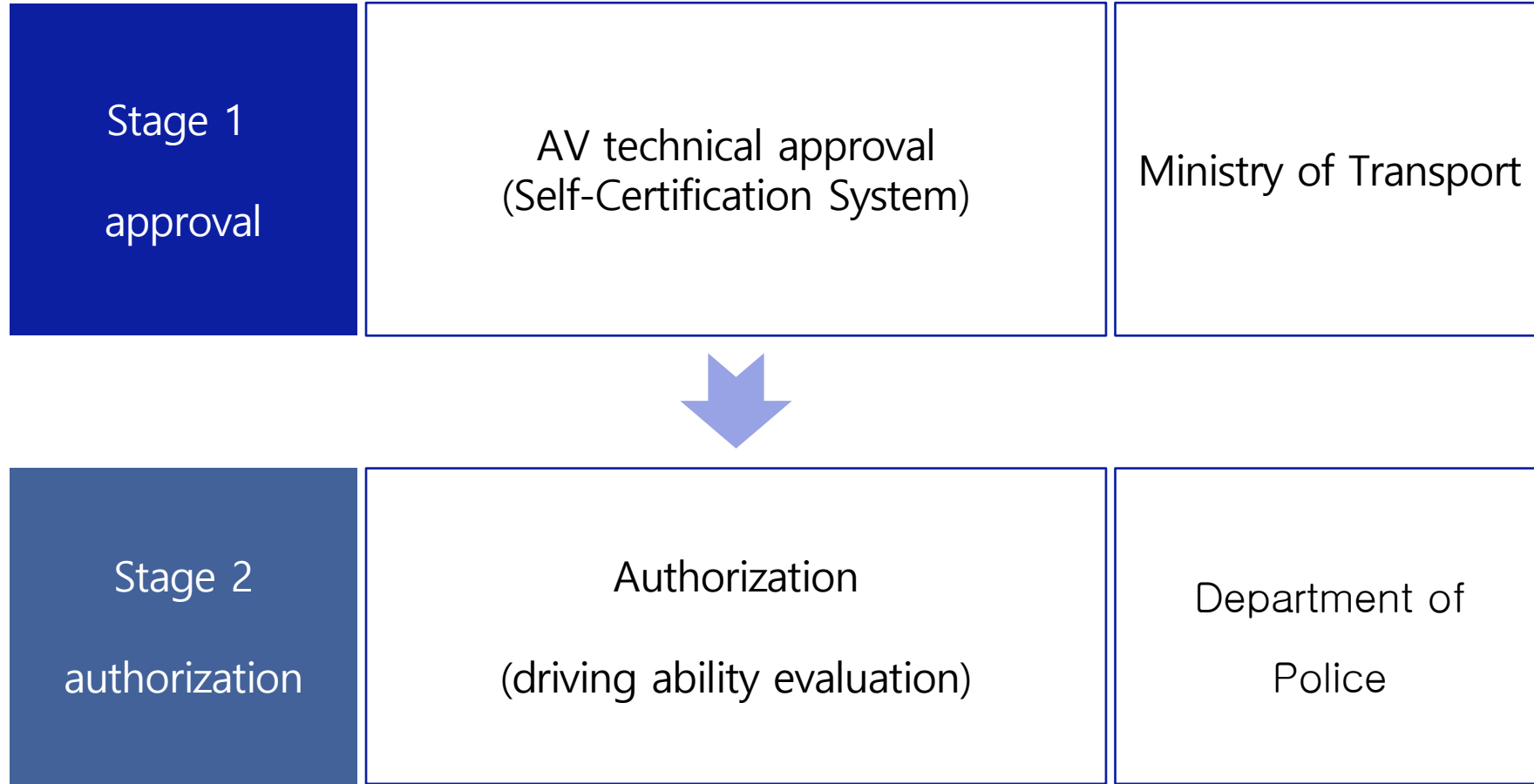
4. Autonomous Driving Vehicle's Authorization

■ ■ ■ The key points of the Level 4 autonomous driving regulation system

- New Certification System + Public Road Driving Test (2 stage process)
- The Korean Ministry of Transport is planning to introduce a new certification for level 4 autonomous vehicles by revising the Autonomous Vehicle Act
- The Korean Police Department is planning to introduce an Authorization (Driving Test) for Level 4 autonomous vehicles by establishing the Autonomous Vehicle Operation Act

4.1 The Two-Stage Process (Level 4)

Approval and Authorization of Level 4 AV



Evaluation on Compliance with Road Traffic Act

Category	No	Scenario	Detailed Evaluation Content
M02 Maintaining Lane	10	Adherence to Right-hand Driving	<ul style="list-style-type: none"> · Staying in lane without crossing the center line on roads with marked lanes / Driving on the right side on roads without marked lanes. · Checking the 5 exceptions for right-hand driving: one-way traffic, road damage & construction, overtaking, narrow roads, and other methods (Safety Signs 326~328, 135).
	11	Compliance with Vehicle Passage	<ul style="list-style-type: none"> ① Confirming vehicle passage on narrow roads: <ul style="list-style-type: none"> · Whether to slow down or stop and move to the rightmost edge. · Yielding by vehicles without passengers and not carrying any cargo. · Yielding by vehicles without right-of-way as indicated by safety signs (Safety Sign 332). ② Vehicle passage on steep narrow roads (6.5~12.5% gradient): <ul style="list-style-type: none"> · Whether vehicles moving uphill yield.
	12	Maintaining Lane in Straight Sections	<ul style="list-style-type: none"> · Checking if a vehicle sways left and right, drives biased to one side, or infringes upon another lane during straight driving.
	13	Maintaining Lane in Curved Sections	<ul style="list-style-type: none"> · Checking speed to prevent derailment on curved roads $V = \sqrt{R \times g \times (e + f)}$ · Checking speed on convex sloping roads $V = \sqrt{770(aL/A) + (2.5a)^2} - 2.5a$ · Checking speed on concave sloping roads $V = \sqrt{2a \sqrt{120(L/A) - (1.75(L/A))^2} + 3.5(aL/A) + (2.5a)^2} - 2.5a$ <ul style="list-style-type: none"> · Checking speed to mitigate impacts on sloping roads $V = \sqrt{360(L/A)}$
	14	Violations in Designated Lanes	<ul style="list-style-type: none"> · Checking compliance with designated lanes (Highways with 2 lanes and 3 or more lanes, left/right lanes on non-highway roads).
	15	Violations in Exclusive Lanes	<ul style="list-style-type: none"> · Checking violations on bus, tram exclusive lanes, and bicycle-only roads (Safety Signs 330, 331 of 2, 318). · Confirming passage of cars/vans with 3 or more passengers on carpool lanes (Safety Sign 331).
	16	Compliance with Pedestrian-only Road Passage Prohibition	<ul style="list-style-type: none"> · Checking for infringements on walkways separated from vehicle lanes (stone-separated, edge zones). · Checking for violations of the pedestrian-only road passage prohibition (Safety Sign 321).

Evaluation on Compliance with Road Traffic Act

Category	No	Scenario	Detailed Evaluation Content
M03 Distance Between Vehicles	17	Maintaining Safe Distance while Following Forward Vehicle:	<ul style="list-style-type: none"> · Confirming the minimum forward detection distance on straight and curved roads (based on standards set by the Ministry of Land, Infrastructure, and Transport). · Confirming the maintenance of the minimum forward safety distance (2-second Rule) (based on standards set by the Ministry of Land, Infrastructure, and Transport). $S = \max [\min (V_{ALKS} + t_{front1}, V_{ALKS} + t_{front2}), 2]$
	18	Ensuring Safe Distance during Cut-in	<ul style="list-style-type: none"> · Confirming the safety distance for vehicles cutting in during acceleration, steady speed, and deceleration (emergency braking within 0.5G). $TTC_{차로진입} \geq V_{상대} / (2 \times 6^{m/s}) + 0.35초$ Conditions checked (based on standards set by the Ministry of Land, Infrastructure, and Transport).
	19	Ensuring Safe Distance during Cut-out	<ul style="list-style-type: none"> · Confirming the safety distance after a car moves out and a decelerating vehicle appears (emergency braking within 0.5G)
	20	Ensuring Safe Distance during Deceleration	<ul style="list-style-type: none"> · Confirming the corresponding safe distance when the vehicle in front decelerates (emergency braking within 0.5G)
	21	Compliance with Speed Limits	<ul style="list-style-type: none"> · Checking compliance with the maximum and minimum speeds indicated by safety signs (Safety Signs 224,225). (Excluding compliance with the minimum speed during traffic congestion or other inevitable circumstances).
	22	Deceleration in Adverse Weather	<ul style="list-style-type: none"> · Reduce maximum speed by 20% during: ① Wet road due to rain ② Snow accumulation less than 20mm. · Reduce maximum speed by 50% when: ① Visibility is under 100m due to heavy rain, heavy snow, fog, etc. ② Roads are frozen ③ Snow accumulation of 20mm or more.
	23	Response to Road Damages and Other Obstacles	<ul style="list-style-type: none"> · Confirming response measures such as deceleration, stopping, or lane changing to road obstacles (road damages, fallen objects, speed bumps, etc.) (Safety Signs 129, 130, etc.)
	24	Response to Road Construction Zones	<ul style="list-style-type: none"> · Confirming response measures such as deceleration, stopping, or lane changing in road construction zones (Safety Sign 135).

Evaluation on Compliance with Road Traffic Act

Category	No	Scenario	Detailed Evaluation Content
M04 Overtaking	31	Compliance with Overtaking Methods	<ul style="list-style-type: none"> · Adherence to lane change signals and a safe speed (signaling 30 meters in advance, within the speed limit). · Ensuring compliance with overtaking from the left of the vehicle you intend to overtake. · Ensuring adequate distance in front of the side vehicle when returning after overtaking. · Avoiding behavior that obstructs other vehicles trying to overtake (like competitive driving or blocking the way). · Ensuring a clear path for overtaking with attention to oncoming traffic on a two-way, two-lane road. <p>(Overtaking Path = Entry Distance(d1) + Travel Distance(d2) + Margin(d3) + Opposing Vehicle Travel Distance(d4))</p>
	32	Compliance with No Overtaking Times and Places	<p>① Violations of no-overtaking periods within certain sections</p> <ul style="list-style-type: none"> · When there's another vehicle parallel to the car in front on its left. · When the car in front is overtaking another vehicle or intends to do so. · For vehicles that are stationary or moving slowly (due to adherence to regulations, police instructions, or to prevent danger). <p>② Violations of no-overtaking zones within certain sections</p> <ul style="list-style-type: none"> · At intersections, inside tunnels, on bridges, on curves, on sloping roads, and other areas designated by safety signs.
	33	Prohibition of Cutting In	<ul style="list-style-type: none"> · Changing lanes without ensuring a safe distance from vehicles in front and behind due to traffic congestion at road merging/diverging points.
	34	Yielding to Slower Vehicles	<ul style="list-style-type: none"> · Yielding the way on roads without designated lanes when driving slower than the car behind (towards the rightmost edge).

4.2 The 'Driver' of autonomous driving vehicle

■ ■ ■ The 'Driver' and the 'Responsible' in Autonomous Driving Era

○ Autonomous driving provider as the 'Driver'

➡ For the autonomous driving system's driving, other subject takes the responsibility

- Appropriate for Connected-type autonomous driving
- Protects innovative growth motivation for autonomous driving market

○ Autonomous driving system as the 'Driver'

➡ Manufacturers which actually control the autonomous driving system's operation

- Relatively clear legal liability roles
- Regards to expansion of people's acceptance

5. Autonomous Driving Vehicle's Ethical Problem

■ ■ ■ Government's Role in Ethics Policy

- When autonomous driving vehicle is permitted, we must discuss the ethical policies
- The Pros and Cons of choosing the vehicles based on ethical approach method in the free market
- Overcoming technical efficiency obstacles – protecting the human right's perspective, technical improvement orientation towards a democratic and free society
- It is important to certify ethical principles and transparent coherency to programming : government unit or international cooperation
 - Overall coherent and reflection on public value in the autonomous vehicle industry

6. Human Factor in the Safety of AV

■ ■ ■ The two aspects of human factors

○ How human subjects respond when an error occurs in the AV system

➔ This is a problem in a more structured and standardized area

- create appropriate manuals, conduct relevant training, review the qualification systems

○ Human subjects need to be able to take appropriate actions to unpredictable situations.

➔ This is a relatively unstandardized and unstructured area

- to achieve this, it is necessary to improve the resilience of human subjects.

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