ISMR GID

Location:

- 5.1.8.2., 5.4.3., 5.4.4., 5.4.5, 5.4.7.1. Annex 2 and Annex 3 GTR;
- 3.2.3., 7.1.8.2., 7.4.3., 7.4.4., 7.4.5, 7.4.7.1. Annex 4 and Annex 5 (UNR)

UNR 3.2.3. *In the case of ADS with features that can be active in the territory of Contracting Parties other than the Contracting Party issuing the approval, the manufacturer shall provide to the granting approval authority the following information for each territory:*

……..

*(f) Details of the authorities identified for fulfilling the obligation to provide post-deployment notifications and reports to the **relevant authority**.*

UNR/GTR 5/7.1.8.2. *The processes for ISMR shall demonstrate the capabilities*

….

*(g) To report occurrences to the **relevant authority** when they occur, and*

UNR/GTR 5/7.4.3. *The manufacturer shall provide initial notifications, short-term reports, and periodic reports to the **relevant authority**.*

UNR/GTR 5/7.4.4. *The manufacturer shall provide the supporting data underpinning the report by means of an agreed data exchange mechanism upon request by the **relevant authority**.*

UNR/GTR 5/7.4.5. *The manufacturer shall provide the **relevant authority** with a description of the data processing (for example: filtering and conditioning) procedure and agree on the steps undertaken to deliver the data supporting the report.*

UNR/GTR 5/7.4.7. *Initial notifications*

UNR/GTR 5/7.4.7.1. *The manufacturer shall notify the **relevant authority** of a critical occurrence without unreasonable delay in accordance with the applicable laws after becoming aware of it.*

UNR/GTR Annex 2/4, In-Service Reporting Template: Short-term Reporting

*1.1 The following template aims at ensuring that a consistent and comprehensive set of information is delivered to the **relevant authority** to foster an effective implementation of the short-term reporting ISMR requirements.*

UNR/GTR Annex 3/5, In-Service Reporting Template: Periodic Reporting

*1.2. The following template aims at ensuring that a consistent and comprehensive set of information is delivered to the **relevant authority** to foster an effective application of the periodic reporting scheme. Further granularity of the information can be considered depending on the ADS use cases*

Subject: Relevant Authority

Explanation

The ADS regulation refers to a generic Relevant Authority in the following paragraphs concerning the post deployment safety:

- UNR: 3.2.3., 7.1.8.2., 7.4.3., 7.4.4., 7.4.5, 7.4.7.1. Annex 4 and Annex 5
- GTR: 5.1.8.2., 5.4.3., 5.4.4., 5.4.5, 5.4.7.1. Annex 2 and Annex 3

In this regard, Relevant Authority means any authority* as identified in applicable law, for whom the manufacturer is required to provide post-deployment notifications and reports related to the operation of Automated Driving Systems (ADS).

> ***UNR only:*** Without prejudice to applicable laws, it must be noted that the responsibility for assessing and/or acting upon the content of the post-deployment notifications and reports as per the requirements of this regulation is held by the Granting Type Approval Authority as described in Section 8 of the ADS regulation.

Location: ***UNR 3.2.3, UNR/GTR 5/7.4.3***
UNR 3.2.3. *In the case of ADS with features that can be active in the territory of Contracting Parties other than the Contracting Party issuing the approval, the manufacturer shall provide to the granting approval authority the following information for each territory:*

……..

(f) Details of the authorities identified for fulfilling the obligation to provide post-deployment notifications and reports to the ***relevant authority****.*

UNR/GTR 5/7.4.3*. The manufacturer shall provide initial notifications, short-term reports, and periodic reports to the* ***relevant authority****.*

Subject: Dissemination of the notifications, short-term reports, and periodic reports to the relevant authority Relevant Authority (Pr. High)

Explanation

The dissemination of information is intended to be limited to the (relevant) authorities for whom such information is relevant. The type of information (e.g. notification, short term and periodic report) provided to each authority can depend on factors such as: the authority's role in approving, verifying compliance or conducting market surveillance of the considered ADS; the area of operation of the considered ADS; and the need to access such information to discharge safety-related responsibilities as defined by the applicable laws.

Example:

This example is intended to provide guidance an on an acceptable way to comply with the requirements ***UNR 3.2.3.*** *f)*

The following scheme is without prejudice with the applicable law and does not create any obligation for Manufacturers and Authorities. It is only intended to suggest a harmonized and balanced approach for the dissemination of the initial notification, short term reporting and periodic report which identify appropriate relevant authorities for each type of occurrence reporting.

Table 1 Occurrence dissemination

Relevant Authority	Initial Notification	Short term report	Periodic Report

Granting Type Approval Authority*	X	X	X
Authorities in the territory where the occurrence(s) occurred*	X	X	X**
Authorities within the ODD (outside the occurrence territory) *		X***	X**

*Including supranational authorities (if any) who need to access such information as per the criteria listed above

** The regulation does not preclude the possibility to provide country specific information at the agreement of the manufacturer and receiving authority

*** Limited to the corrective actions identified in the Short-Term template

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Location: ***UNR 7.4.4.***

UNR 7.4.4. The manufacturer shall provide the supporting data underpinning the report by means of an agreed data exchange mechanism upon request by the relevant authority.

Subject: Data exchange mechanism (UNR only)

Explanation

Concerning the requirement 7.4.4., the relevant authority is intended as Granting Type Approval Authority (GTAA) and Authorities in the territory where the occurrence occurred for short term report and GTAA for periodic reporting.

Location: ***UNR 7.4.5.***

Subject: **Data Processing**

UNR 7.4.5., The manufacturer shall provide the relevant authority with a description of the data processing (for example: filtering and conditioning) procedure and agree on the steps undertaken to deliver the data supporting the report.

Explanation

Concerning the requirement 7.4.5. the relevant authority is intended as the Granting Type Approval Authority (GTAA) and the other Authorities that receive the occurrence report. However, the agreement on the step to be taken, to provide the data is only undertaken with the GTAA.

Location: Annex 4 4.1 (c) (GTR) / Annex 6 4.1 (c) (UNR)

Annex 4 4.1 (c) (GTR) / Annex 6 4.1 (c) (UNR): *"The applicable Delta-V thresholds to be met according to the EDR system fitted on the vehicle"*

Subject: EDR threshold

Explanation

Different regulatory schemes are in place concerning EDR depending on the contracting party and on the ADS vehicle category. As such, the concept of 'applicable' firstly refers to the 'if-fitted' nature of the EDR.

Where the EDR is fitted to the ADS vehicle, the 'applicable' Delta-V trigger in the context of a critical occurrence, this is understood as the *data recording*

triggering conditions related to vehicle velocity changes defined in the relevant EDR Regulation applicable to the vehicle category concerned.

Example:

This example is intended to provide guidance on an acceptable way to comply with the requirements, for example, depending on the contracting party and on the ADS vehicle category, the following references may apply:

1. UN Regulation No. 160 applies to vehicle categories M1 and N1;
2. U.S. 49 CFR Part 563 applies to passenger cars, multipurpose passenger vehicles, trucks and buses with a GVWR of 3,855kg or less.

For vehicle categories M2, M3, N2, and N3 , the UN Regulation No. 169 may be considered as reference. However, this regulation does not include a representative delta V threshold (neither the last stop or sudden deceleration triggers are delta V thresholds). Anyway, an appropriate delta V threshold, which fulfils the EDR requirements, may be selected as a trigger by the manufacturer in agreement with the GTAA

Location: UNR 3.3. and 8.4.4., GTR 6.4.4.

Subject: Confidentiality and publication of ISMR information

Explanation

As stated in ECE/TRANS/WP.29/2024/39 (i.e., Integration Document for ADS), the aim of ISMR is to contribute to the improvement of road safety by ensuring that relevant information on safety is collected, processed, and disseminated.

Concerning the information sharing, ECE/TRANS/WP.29/2024/39 recommends the exchange of information among relevant Authorities to support the evaluation of the occurrences. At the same time, ECE/TRANS/WP.29/2024/39 states that the dissemination of information should be limited to what is strictly required for the purpose of its users (i.e., Relevant Authority), to ensure appropriate confidentiality of that information.

In particular, the information should be only used for safety related activities and not for any other purpose.

It is not intended for ISMR information to be shared publicly, excluding for aggregated road safety statistics or to support any future activities on harmonised scenario sharing mechanisms. If authorities publish such ISMR information it is expected that the information is anonymised (i.e., to avoid the identification of individual manufacturers, vehicles, systems, or operators) and where possible aggregated.

This interpretation applies to any authority receiving information under this Regulation, whether acting as a Type Approval Authority or as another relevant authority. It does not restrict the exchange of information between authorities where required or permitted by law, or the publication of information for safety purposes where required or permitted by law (e.g.: recalls, investigations), nor does it override obligations arising from applicable laws, including freedom of information, data protection, or privacy legislation.

Location: 5.1.8.2 (h) (GTR) / 7.1.8.2 (h) (UNR

The processes for ISMR shall demonstrate the capabilities:

(a) To monitor ADS operations,

(b) To confirm the compliance with the defined safety case and compliance with the performance requirements,

(c) To identify safety risks related to ADS performance that need to be addressed in the frame of the SMS activities, including instances of non-compliance with ADS safety requirements,

(d) To manage potential safety-relevant gaps during the in-service operation and to provide the information that allows the ADS to be updated according to the appropriate manufacturer processes,

(e) To support the development of new or revise existing scenarios,

(f) To perform event investigation,

(g) To report occurrences to the relevant authority when they occur, and

(h) To share learnings derived from occurrence analysis which have triggered SMS processes ***for the continuous improvement of the ADS vehicle safety***

Subject: Continuous Improvement

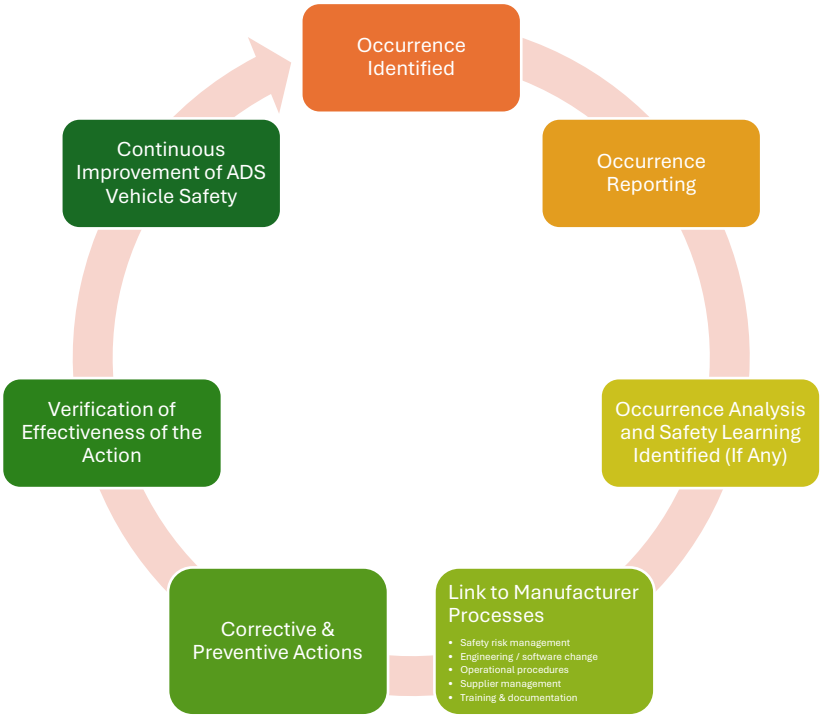
Explanation

This requirement is an integral part of the manufacturer's Safety Management System (SMS) and it is expected to be implemented through the established SMS processes for occurrence reporting, analysis, and continuous improvement.

In general, any occurrence that has been identified during the post-deployment phase is handled within the SMS framework through the relevant manufacturer processes (e.g., safety risk management, engineering change management, software lifecycle management, supplier management, and operational procedures).

In this context, the requirement aims at ensuring that occurrence analysis is not an isolated activity but is undertaken as part of a structured SMS derived process that is traceable from the occurrence to safety decisions, actions, and leads to demonstrable safety improvements (where applicable).

The following flowchart provides an example which is intended to clarify the interconnections among Manufacturer's processes.



It is worth clarifying that an occurrence does not always lead to the identification of a safety learning or a corrective/preventive action. In addition, not all the identified corrective/preventive action must be implemented to close the occurrence. As with improving any engineering system the decision of what to fix and how depends on an overall judgment of the consequences and impact of making a change.

Location: Annex 1/3

Subject: List of reportable occurrences by reporting type

Explanation

The ADS regulation includes a list of reportable occurrences. However, the regulation does not provide examples of situations which fall into such occurrences categories.

Examples

These examples are intended to provide guidance on situations triggering occurrences listed in the regulation.

The following information does not create any obligation for Manufacturers and Authorities.

1. <u>"ADS operation outside its ODD"</u>

Such an occurrence is expected to be reported when:

- The ADS unintentionally continues to perform the DDT outside declared ODD limits;
- The ADS accepts activation outside the declared ODD boundaries;
- The ADS fails to detect ODD boundaries;

- The ADS does not transit to a safe state (MRC or deactivation) within the manufacturer-defined acceptable response time as documented in the safety case.

Occurrences where the ADS temporarily operates outside the ODD as part of a controlled and designed ODD exit strategy (e.g., execution of a fallback response after ODD violation is slightly delayed to ensure minimized disruption to the traffic flow) to minimize safety risk may be distinguished from unintended ODD violations.

2. **"ADS failure to achieve a mitigated risk condition when necessary"**

Such an occurrence is expected to be reported when an MRC is required, but:

- The ADS does not initiate any fallback to MRC when required (e.g., ODD exit, significant ADS failure, collision detected, detection that fallback user is not available, failure of the fallback user to take control following a system-initiated deactivation of the ADS);
- The ADS does not complete the fallback response to an MRC when required;
- The ADS performs the MRC, but an unsafe stop location is selected;
- Conflicts occur during the MRC (e.g., collision takes place as part of performing the MRC).

3. **"Failure to meet the ADS requirements under paragraph 6 of this Regulation"**

Failures include:

- Systematic or repeated deviations from the DDT performance requirements defined under paragraph 6;
- Safety case assumptions related to ADS performance of the DDT violated under real-world operation;
- Unexpected degradation of the performance thresholds as indicated in the safety case;
- Collisions;
- Deviation from Remote Interaction/Intervention as described in the Safety case.

4. **"Performance issues constituting an unreasonable risk to safety"**

This occurrence should be understood as deviations, degradations, or limitations in the ADS capabilities that affect its ability to perform its intended driving task safely within the declared ODD and is beyond the expected variability or acceptable degradation. This occurrence is intended to complement more specific reportable occurrences by capturing safety-relevant performance concerns that may not be directly associated with a single discrete failure or event.

The following are examples of this type of issue:

- Violation of performance thresholds as indicated in the Safety case
- An identified reduction in the safety margins;
- Exceeding overall hazard exposure thresholds;
- An increase in the rate of hazardous event occurrences
    - These may not be "serious", but the increase suggests some underlying problem.

5. **“Uncompleted system-initiated deactivation processes to manual driving”**

Such an occurrence is expected to be reported when:

- The system-initiated deactivation is not successfully completed;
- The user is not properly engaged when the deactivation process initiates;
- ADS remains partially active resulting in a state where the driving responsibility is unclear.

6. **“Communication issues affecting the safety of the ADS”**

Such an occurrence is expected to be reported in case of:

- The remote interaction is unavailable;
- A V2X service is required but unavailable;
- Information latency exceeds safety threshold.

7. **“Cybersecurity issues affecting the safety of the ADS”**

Such occurrence is expected to be reported in case of:

- Safety-relevant ECU compromised;
- Integrity of perception/planning data affected;
- ADS control channel manipulated.

Such reporting is expected to be aligned with CSMS procedure where R155 is applied.

8. **“System failures that compromise the capability of the ADS to perform the entire DDT”**

Such occurrence is expected to be reported in case of:

- A loss in the redundancy of the perception system or a reduction in the capabilities of the perception system;
- An ADS-used actuator failure;
- Degradation in the computational performance required by the ADS.

9. **“Maintenance or repair issues affecting the ADS's intended functionality”**

Such an occurrence is expected to be reported in case of:

- Sensor misalignment;
- Calibration drift;
- Outdated safety-critical software.

10. **“Unauthorized modifications to ADS that could affect the intended functionality”**

Such an occurrence is expected to be reported in case of:

- Software tampering;
- Sensor obstruction;
- Third-party hardware interfering with ADS.

11. **“Manoeuvres performed to reach MRC”**

Such an occurrence is expected to be reported when the ADS starts a fallback to MRC in case of:

- ODD exit;
- ADS failure;
- Collision detected;
- Detection that fallback user is not available when they have no longer met the conditions of paragraph 6.2.2.1.6 of this Regulation (if applicable), or
- Failure of the fallback user to take control following a system-initiated deactivation of the ADS).

12. <u>"Emergency Manoeuvres"</u>

Such an occurrence is expected in case of a situation or an event that leads to a collision of the vehicle with another road user or an obstacle that cannot be avoided by a braking demand lower than 5 m/s^2. This also includes situations where the collision is avoided by a braking demand lower than 5 m/s^2 in combination with steering application, in case the ADS cannot avoid the collision only by a braking demand lower than 5 m/s^2 for the same situation.

13. <u>"Active ADS feature required remote interaction to navigate a driving situation"</u>

N/A

14. <u>"Fallback user unavailability"</u>

Such an occurrence is expected to be reported when:

- No response within required time (e.g., warning);
- MRC required due to non-response.

15. <u>"Prevention of takeover under unsafe conditions"</u>

Such an occurrence is expected to be reported when situation is unsuitable or unsafe for the subsequent mode of vehicle operation.

Location: Annex 2/4

Subject: Short-term reporting template

Explanation / Examples

This information intended to provide guidance on some items of the short term template

OCCURRENCE DETAILS

1. "ODD conditions relevant to the occurrence analysis"

The taxonomy presented in ISO 34503 may be used to document the relevant ODD condition in the short-term reporting.

VEHICLE DETAILS

2. "Vehicle approval number"

Vehicle approval number is clearly defined under UNR and/or national or supra-

national regulatory frameworks. However, countries using a different scheme from the type-approval one may use an alternative identifier to retain a link between the ADS vehicle and its certification documentation.

3. “Vehicle category”

Vehicle category may use the Consolidate Resolution on the Construction of Vehicles (R.E.3) where applicable.

4. “ADS identifier”

Where UNR 156 applies, the RXSWIN may be used as the ADS identifier. Countries where UNR 156 is not enforced may devise an alternative identifier to retain the traceability of the ADS software version.

5. “ADS licensing authorities”

In case such an information is available and applicable, this field reports the authorities who gave authorization for the ADS vehicle involved in the occurrence to be operated in the area,

WHERE

6. “Roadway description”

An example of how to fill in roadway characteristics:

- Roadway type: Urban arterial
- Roadway surface: Asphalt
- Roadway description: Four-lane divided road with sidewalks on both sides, signal-controlled intersections, moderate traffic volume, and posted speed limit of 50 km/h.

KNOWN OR ALLEGED DAMAGE

7. “Description of damage to the ADS vehicle”

Document ECE/TRANS/WP.29/2024/39 provides a possible categorization for the damage level:

a) destroyed: the damage makes it inadvisable to restore the vehicle;

b) substantial: the vehicle sustained damage or structural failure requiring major replacement;

c) minor: the vehicle can be rendered operational by simple repairs/replacement;

d) none: the vehicle sustained no damage;

e) as reported from third-party sources;

f) unknown: the damage level is unknown.

DESCRIPTION OF THE OCCURRENCE

8. “Detailed description”

Depending on the nature of the occurrence, the guidance documented under “**Guidance for the characterization of the occurrences”** may support filling this field.

9. “Post-occurrence behaviour”

Depending on the nature of the occurrence, the guidance documented under “**Guidance for the characterization of the occurrences”** may support filling this field.

ANALYSIS

10. “Root cause analysis”

Depending on the nature of the occurrence, the guidance documented under "**Guidance for the characterization of the occurrences"** may support filling this field.

Location: Annex 3/5

Subject: Periodic reporting template

This information intended to provide guidance on some items of the periodic template

ADS IDENTIFICATION

1. "ADS software version/identifier(s)"

Where UNR 156 applies, the RXSWIN may be used as the ADS identifier. Countries where UNR 156 is not enforced may devise an alternative identifier to retain the traceability of the ADS software version.

2. "Vehicles equipped with ADS"

The periodic reporting template only requires the total number of vehicles equipped with the same approved/certified ADS to be reported. This interpretation does not exclude the possibility for the manufacturer to provide additional granularity regarding different ADS versions if deemed necessary for the safety argumentation.

ADS OPERATION INFORMATION (segmented by ADS feature)

3. "Weather conditions"

The taxonomy presented in ISO 34503 may be used to document weather condition in the periodic reporting.

4. "Average ADS time engagement"

OCCURRENCES ASSESSMENT (segmented by ADS feature)

Occurrences covered under the periodic reporting provisions

Each of the following occurrences is accompanied by an "occurrence safety review" field where it is expected that the manufacturer provides additional explanation for any safety concern identified or any supplementary information to support the correct understanding of the occurrence by the assessor.

ADS MONITORING ASSESSMENT (segmented by ADS feature)

5. "SPIs monitoring analysis"

The list of SPIs presented in 'Guidance on Safety Performance Indicators' may be used to derive suitable indicators. The expectation for this entry in the periodic reporting template is for the manufacturer to report on the actual metrics and to provide an explanation for any discrepancy identified between the safety case's claims and the operational phase.

Location: 5./7.1.8.5.5. (a)

5/7.1.8.5.5. The manufacturer shall achieve the following objectives from the monitoring activity:

(a) Verify the safety performance (i.e., Safety Performance Indicators) and confirm the in-service safety level of the system (i.e. metrics and thresholds), fallbacks, collision avoidance, emergency manoeuvres),

Subject: Guidance on Safety Performance Indicators

Explanation /Examples

The Regulation mandates the manufacturer to define and monitor Safety Performance Indicators (SPIs) for the ADS throughout their lifetime in line with SMS best practices.

SPIs are measurable metrics that can be used to monitor, assess, and demonstrate the ADS compliance with Regulation during the operational phase. SPIs are generally use-case dependent and can be broadly classified into *lagging* and *leading*.

Lagging SPIs measure safety outcomes after the relevant event has taken place (reactive) and are normally linked to high-severity occurrences.

Those may be, for instance:

- Collision rate per million km;
- Injury and / or fatality rate;
- Property damage claims.

Leading SPIs measure precursors (proactive) and safety-relevant events with the main aim to confirm that the actual safety performance of the ADS does not deviate from the expected safety performance documented in the safety case. Leading SPIs may be, for instance:

- near-miss frequency (TTC, or other safety metrics thresholds reached);
- safety envelope violations;
- ADS fallback response and takeover request rates[1];
- safety-critical scenario exposure;
- perception system misclassification/failure rates;
- fail-safe activation success rate.

Location: 5./7.1.8.5.5. (d)

5/7.1.8.5.5. The manufacturer shall achieve the following objectives from the monitoring activity:

(d) Characterise and analyse occurrences,

Subject: Guidance for the characterization of the occurrences

Explanation /Examples

These examples are intended to provide guidance about valuable information that is useful in for the characterizing of the occurrences that may be relevant for either of both monitoring and reporting. The following information does not create any

[1] It is acknowledged that takeover requests are part of the normal operation of the ADS. However, a significantly higher rate than expected or a drifting rate over time can be sources of concerns worth monitoring.

obligation for Manufacturers and Authorities. It is only intended to provide suggestions

Occurrence	Metrics and relevant information
ADS operation outside its ODD	Single event: • Type of ODD condition that has been exceeded (e.g., weather, speed, road type, etc.); • Duration of ADS operation whilst outside the ODD (seconds); • Distance travelled whilst ADS is operationalized outside the ODD (meters); • ODD exceedance detection latency (s); • ADS reaction / activity once ODD exit detected (e.g., MRC, deactivation). Aggregated events~~:~~ • Number of ODD exceedances per 100,000 km: • Number of ODD exits per "ADS in operation" hours, • Number of exists per 100000 correctly detected exits • Mean duration of ADS operation outside ODD; • Proportion of occurrences automatically corrected by the ADS within the manufacturer-defined acceptable time interval;
ADS failure to achieve a mitigated risk condition when necessary	Single event: • Trigger cause for the unsuccessful MRC; • Time-to-MRC initiation; • Time-to-MRC completion; • Road type / traffic density; • Final ADS state (e.g., stop achieved, user take-over, etc.). Aggregated events: • MRC failure rate per 10000 attempts; • Average time-to-MRC initiation/completion; • Proportion of MRCs completed within the ADS safety envelope / margins. • Collisions during MRC per 100000 km.

Failure to meet the ADS requirements under paragraph 6 of this Regulation"	Single event: • Requirement breached; • Duration of non-compliance. Aggregated events: • Number non-compliance per release version per 100000 km; • Number of recurrences after corrective action per 100000 Km; • Affected vehicle fleet percentage
Performance issues constituting an unreasonable risk to safety	Single event: • Increasing occurrence Recurring of harsh braking in nominal situations; • Delayed fallback after failure detection; • Recurring reduction of minimum TTC or other safety metrics; • Recurring infringement of safety envelope boundaries. Aggregated events: • Rate of safety performance issues per 100000 km of ADS operation; • Average time between unexpected (e.g., harsh braking in nominal situations) control actions; • Hazard exposure frequency compared to the safety case assumptions.
Uncompleted system-initiated deactivation processes to manual driving"	Aggregated events: • Transition duration; • Driver engagement confirmation time; • Vehicle state at transition; • Failed transitions per 10000 transitions; • Mean time for uncompleted transitions; • % of events exceeding safe transition threshold(s).
Communication issues affecting the safety of the ADS	Aggregated events: • Communication latency; • Signal loss duration; • Communication failure rate per 10000 operational hours;

	• Mean downtime duration; • % resolved via redundancy.
Cybersecurity issues affecting the safety of the ADS"	Aggregated events: • Attack vector; • Duration of exposure; • Safety function affected; • Fail-safe activation status; • Security incidents per fleet-month; • Time to detection; • % neutralized before safety impact.
System failures that compromise the capability of the ADS to perform the entire DDT	Aggregated events: • Subsystem failure; • System configuration and availability including redundancies; • Degradation duration; • System behaviour including and fallback activation; • ADS unavailability or degradation loss rate per million km; • Frequency of redundancy feature activation; • Mean time between critical subsystem failure.
Maintenance or repair issues affecting the ADS's intended functionality	Aggregated events: • Affected subsystem; • Time since last maintenance; • Performance deviation detected; • Maintenance-related safety deviations per 10000 vehicles; • Calibration drift rate; • Software update compliance rate, e.g., failures to perform a successful update. Note, a properly managed software update "failure" should not lead to an ADS problem
Unauthorized modifications to ADS that could affect the intended functionality	Aggregated events: • Modification type; • Safety function impacted; • Measurable performance impact; • Unauthorized modification rate per fleet; • Number of detections before ADS activation per 10000 activations.

Manoeuvres performed to reach MRC	Aggregated events: • Maximum deceleration; • Lane change during the MRC; • Stopping area; • MRC manoeuvres per 100000 km; • % classified as emergency-level and/or condition.
Emergency Manoeuvres	Aggregated events: • Distribution of TTC triggers or equivalent metric for EM trigger; • Peak deceleration reached; • Road users involved; • Emergency manoeuvres per 100000 km; • Collision avoidance success rate.
Active ADS feature required remote interaction to navigate a driving situation	Aggregated events: • Situation type; • Remote response latency; • Duration under remote interaction; • Remote interventions per 10000 hours; • Mean response time; • % time remote interaction required.
Fallback user unavailability	Aggregated events: • User position; • Driver engagement status; • User-engagement monitoring measures; • Response latency; • Non-response rate per 10000 take over request; • Mean takeover time in case of driver unavailability detection; • % exceeding warnings threshold.
Prevention of takeover under unsafe conditions	Aggregated events: • Reason for prevention; • Duration of prevention takeover; • Takeover prevention per 10000 requests; • % justified vs unjustified prevention; • Vehicle dynamics at time.