

ADR: Procuring and managing dangerous goods transport by road correctly

ADR stands for the “Accord relatif au transport international des marchandises dangereuses par route”, the European Agreement concerning the International Carriage of Dangerous Goods by Road. For buyers and supply chain managers, ADR is above all a quality and compliance criterion when selecting freight forwarders and carriers. Anyone shipping or receiving dangerous goods must be able to verify transport documents, classification, packaging and training certificates seamlessly. This article explains the ADR fundamentals, their significance for procurement, and practical controls and key figures.

Key facts

- ADR governs the international road transport of dangerous goods in Europe, including classification, packaging, marking and transport documents.
- In practice, the transport of dangerous goods requires specially trained personnel whose training typically has to be renewed about every two years.
- Buyers should anchor ADR competence as a mandatory criterion in supplier selection and in tenders.
- Typical responsibilities within the company concern consignors, packers, carriers and consignees; the exact assignment of responsibility must be examined legally on a case-by-case basis.
- Dangerous goods classes, for example for flammable liquids or corrosive substances, determine packaging, marking and transport modalities.
- Storage and handling at the interface between transport and production are also frequently governed by supplementary regulations.

Definition: ADR

ADR is an international treaty that uniformly governs the carriage of dangerous goods by road vehicles across national borders. It describes substance classification, packaging requirements, hazard marking, vehicle technology and the qualification of personnel.

Dangerous goods classes as a basis

ADR divides dangerous goods into nine classes, including explosive substances, gases, flammable liquids, corrosive substances and radioactive materials. The class allocation directly determines the permitted packaging, the marking with class label and UN number, and the quantity limits per carriage. For buyers, the class of their typical requirement is a key selection criterion, because not every carrier is permitted to carry every class. Before tenders, the company's own requirement should therefore be fully prepared by substance name, UN number and packing group.

Limited quantities (LQ) and excepted quantities

ADR provides relaxations for small quantities: excepted and limited quantities (LQ) are partially exempt

from extensive obligations, for example for requirement transports of small quantities such as samples or ADR cleaning agents. These options reduce transport costs and administrative effort, but require precise quantity determination and marking. In practice, the boundary between excepted and fully regulated is not trivial, as several substances in one consignment can be cumulated. Buyers and logistics planning should verify the classification together with the respective consignor or forwarder.

Distinction from other transport modes

ADR is the counterpart to the rulebooks for inland waterway (ADN), rail (RID) and air transport (IATA-DGR for world air traffic). Important for procurement: the same substance may have to be handled differently depending on the mode of transport; a carriage permitted by road may be prohibited or restricted by air. For multimodal chains, the strictest relevant regulation in each case must be observed. This influences the choice of transport mode, cost calculation and scheduling.

Significance for procurement and supplier selection

For industrial companies that procure or ship dangerous substances, ADR competence is a hard selection criterion. It determines whether a supply chain functions in a legally secure manner or whether the company as consignor is exposed to relevant liability risks.

ADR competence as a tender criterion

In tenders for dangerous goods transports, ADR capability should be anchored in the evaluation matrix as a mandatory criterion, not as an option. What is required are verifiable training of drivers and dispatchers, suitable vehicle equipment and functioning dangerous goods advice within the company. A competitive tendering process without verified dangerous goods qualification carries the risk that order processing will later fail. The order confirmation obligation should also be worded so that the promised ADR-compliant execution is expressly confirmed.

Price versus compliance

In practice, dangerous goods transports are typically more expensive than regular transports, as additional training, equipment and liability risks must be factored in. A serious price comparison therefore captures not only the freight price but also additional services such as address services, container provision or emergency assistance. Quotes that are significantly below the usual market level should be critically questioned, especially with tight delivery times. A negotiation protocol with written definition of the dangerous goods modalities protects against later interpretational conflicts.

Contract management and liability

The freight contract should clearly allocate responsibilities: who classifies, who packs, who issues transport documents, who takes over the documentation. In addition, a non-disclosure agreement (NDA) is sensible for sensitive project information when business-critical substance or process data is shared. Legal liability questions, for example in the event of breaches of dangerous goods regulations, must be examined on a case-by-case basis with legal or dangerous goods experts. The delivery and despatch purchasing arrangements and the associated risk allocation provisions must be fixed unambiguously in the contract.

Process integration: from purchase requisition to delivery

ADR-relevant information passes through several stages of the procurement and logistics process.

Those who define the data points early avoid later friction at the interface with the forwarder.

Purchase requisition and material master

Even in the purchase requisition, it should be evident whether the item is dangerous goods, including UN number, class and packing group. In practice, the material master should be set up with dangerous goods data as a mandatory field, ideally coordinated with the material classes in the ERP system. Without complete master data, queries, delays or incorrect transport documents frequently occur. The ABC analysis or the combined ABC-XYZ analysis helps to prioritise the effort: dangerous goods articles with high demand and high volatility deserve detailed data maintenance first.

Transport documentation and papers

In practice, the transport documentation includes substance identification, class, UN number, packing group, quantity details and, where applicable, tunnel code. Depending on the case, further documents are added, such as safety information supporting the warning triangle or shipper's declarations for air freight with the Air Waybill (AWB). Automated formats such as cXML can transmit master data in a structured manner but do not replace professional verification. Incorrect or incomplete documents are one of the most frequent causes of interventions or delays in despatch.

Delivery schedule and deadline monitoring

Dangerous goods deliveries benefit from clear forward planning: the delivery schedule or agreed delivery dates should allow sufficient time for dangerous goods checks, packaging and vehicle dispatch. Deviations due to border controls or special permits require active deadline monitoring and defined escalation paths. For weekly requirements, a rolling delivery schedule with fixed collection days that the forwarder can plan around is advisable. This stabilises capacity utilisation and in practice reduces expensive special trips.

Key KPIs in the ADR context

Measurable key figures make the quality of dangerous goods transports visible and create the basis for supplier evaluation and continuous improvement.

Conformity and quality

The central key figure is the share of correctly documented dangerous goods consignments, in practice typically with target values above 98 per cent. In addition, the number of interventions or control measures per 1,000 consignments and the complaint rate for incorrect dangerous goods marking can be evaluated. Ideally, these figures feed into the supplier evaluation and create an objective basis for development measures.

Delivery reliability and schedule adherence

On-time delivery (OTD) is particularly important for dangerous goods because replenishment is often not possible at short notice. Typical target values in industry are above 95 per cent; higher targets are common for critical dangerous goods. Combined with the schedule reliability of the upstream stage, this yields a picture of the resilience of the entire chain. In the event of non-compliance, a structured root-cause analysis is more important than short-term goodwill.

Costs and capacity utilisation

Dangerous goods-specific costs include freight price, additional services, handling and, where

applicable, special permits. A cost figure per tonne or per consignment, compared across forwarders and over time, reveals efficiency potential. High shares of empty runs or frequent part consignments indicate optimisation opportunities in dispatch planning. Cost development can sensibly be combined with the figures from the ABC-XYZ analysis to set priorities in procurement.

Risks and controls

Non-compliant dangerous goods handling can lead to delays, fines, liability risks and, in the worst case, personal injury. Systematic controls considerably reduce these risks.

Frequent sources of error

Typical errors are missing or incorrect UN numbers, inadmissible packaging, missing training certificates or incomplete transport documents. Overfilling of IBCs or drums beyond permissible fill levels also occurs regularly in practice. A further risk factor is staff turnover: new employees in despatch or dispatch without current training are a frequent cause of deviations. Regular internal audits at the consignor and the forwarder uncover such weaknesses at an early stage.

Training and appointed persons

Companies that ship or carry dangerous goods generally require a person responsible for dangerous goods management as well as trained personnel in despatch and receiving. The training must be renewed periodically; intervals of about two years are common. The buyer should check for valid evidence at the service provider and demand refresher training contractually or as part of a supplier development programme. Documented further training is also a central audit point.

Controls along the supply chain

Effective controls combine pre-checking (qualification evidence at contract award), accompanying checks (document check at despatch of the consignment) and follow-up checks (feedback loop from complaints or authority inspections). It is important that every deviation is systematically recorded and evaluated, for example via a simple event database. For serious deviations, a documented claim notification to the supplier is sensible. All measures should be followed up sustainably in contract management.

Current developments and outlook

The handling of dangerous goods is changing due to regulatory, technical and sustainability-related developments. Buyers should take these trends into account in their procurement strategies.

Regulatory dynamics

The ADR rulebook and national implementations are regularly updated; changes concern, among other things, classifications, packaging regulations and the scope of training. In addition, EU-wide reporting obligations and sustainability requirements come into play, such as CBAM for certain imports, which can also extend logistics documentation. Buyers are well advised to actively track the amendment status of the rulebook and to check service providers for current certificates. Legal details must be examined on a case-by-case basis with dangerous goods experts.

Digitalisation and tracking

Digital transport documents, electronic despatch information and real-time tracking improve

transparency and reduce sources of error. Standards and formats such as cXML or industry-specific EDI variants support structured data exchanges between ERP and the forwarder. In practice, smaller operations still frequently rely on PDF and e-mail processes, which increases susceptibility to errors. Buyers can demand the step-by-step introduction of digital processes as part of supplier development.

Safety and the circular economy

Alongside transport execution, the return of containers and residual materials is coming more into focus in the sense of the circular economy. Return systems for IBCs, drums or gas cylinders reduce material costs and environmental risks but require clear responsibilities and contracts. Incentive models for innovation can motivate forwarders and packers to offer safer and more environmentally friendly dangerous goods solutions. Buyers who evaluate such criteria strengthen security of supply and sustainability at the same time.

Typical metrics

Dangerous goods conformity rate: > 98 %

Share of correctly documented consignments; counts as a core criterion in supplier evaluation

On-time delivery (OTD): > 95 %

In practice, often higher targets for critical dangerous goods

Interventions per 1,000 consignments: < 5

Rule of thumb; high values indicate weaknesses in documentation or training

Cost per tonne of dangerous goods transport: trend monitoring, no fixed value

Comparison over time and across service providers reveals efficiency potential

Practical example

A medium-sized mechanical engineering company regularly uses lubricants, adhesives and cleaning agents, some of which must be classified as dangerous goods. Consignments had previously been handled by several small carriers; repeated queries arose due to incomplete transport documents. As part of a new tender, the company introduced mandatory ADR evidence, systematically built dangerous goods data into the material master and agreed fixed collection days and a documented escalation process with the new main service provider. Within a year, interventions and delays fell significantly and on-time delivery rose noticeably.

- Anchor ADR capability as a mandatory criterion in the evaluation matrix
- Maintain dangerous goods data fully in the material master and link it to the purchase requisition
- Agree fixed collection days in the delivery schedule and structured deadline monitoring
- Contractually anchor annual audit and training evidence from the service provider

Conclusion

For technical buyers, ADR is far more than an abstract rulebook: it determines the permissibility, costs and safety of a substantial part of procurement logistics. Anyone procuring or shipping dangerous goods should anchor ADR competence as a hard criterion in supplier selection, tenders and contract management. Complete material master data, clearly allocated responsibilities and regular controls are the most effective levers against deviations. Measurable key figures such as on-time delivery and conformity rate make quality transparent. Since the rulebook and sustainability requirements are

continuously developed further, an annual review of the company's own dangerous goods processes and service providers is worthwhile.

Frequently asked questions

What does ADR mean in transport?

ADR is the abbreviation of the European Agreement concerning the International Carriage of Dangerous Goods by Road. It governs classification, packaging, marking, documentation and staff qualification. It is therefore the definitive legal basis for the transport of dangerous goods by lorry across national borders.

When does ADR also apply to domestic transports?

Many member states largely adopt ADR provisions for domestic carriage as well, partly with relaxations. The exact national adaptations differ from country to country and must be examined on a case-by-case basis. For practitioners, the safe assumption is that ADR-like obligations can also arise for domestic transports. It is advisable to verify the national implementation and any exemptions with a dangerous goods safety adviser.

Which dangerous goods classes exist under ADR?

ADR distinguishes nine classes, including explosive substances, gases, flammable liquids and solids, substances liable to spontaneous combustion, substances which emit flammable gases in contact with water, oxidising substances, toxic and infectious substances, radioactive material, corrosive substances and miscellaneous dangerous substances. The class essentially determines packaging, marking and transport rules. For procurement, the class of the typical requirement is a key selection criterion.

Who is liable for ADR breaches in transport?

Responsibilities are distributed along the chain among consignor, packer, carrier, loader and consignee, depending on role and individual case. Companies can be affected in terms of liability for breaches by service providers, for example through insufficient verification of their own declarations. Contracts should therefore stipulate responsibilities and verification duties in writing. Specific liability questions must be clarified on a case-by-case basis with legal or dangerous goods experts.

How often must dangerous goods training be renewed under ADR?

Typically, training of the personnel involved must be refreshed about every two years; the exact requirements depend on role and country. Drivers carrying dangerous goods usually carry a special training certificate. Buyers should check for valid evidence at the service provider and contractually demand its regular renewal.

What is the difference between ADR and IMDG?

ADR applies to road transport in Europe, IMDG (International Maritime Dangerous Goods Code) to sea transport. Both rulebooks work with similar substance classes and UN numbers but differ in details of packaging, marking and documentation. For multimodal transports, both rulebooks and, where applicable, further ones must be observed. The strictest applicable set of rules in each case is decisive.