

Classification of dangerous goods



Safe production, transport, storage and use

Every year, millions of tonnes of chemicals, mixtures and articles are made and transported worldwide. Without proper control, they can be explosive, flammable or thermally unstable. Regulations exist to keep their production, transport, storage and use safe. TNO Process Safety Solutions has decades of experience in testing and classifying dangerous goods, developing test methods, and advising authorities and industry.

Regulations

The UN Recommendations on the Transport of Dangerous Goods form the worldwide basis of transport regulations. They are adopted in national and international rules such as ADR, RID and the IMDG Code. Classification criteria are largely harmonized through the GHS and the European CLP Regulation. Every dangerous substance or article must be properly classified, packaged and labelled. The test methods are described in the UN Manual of Tests and Criteria.

Our expertise

We assess the classification and labelling of a wide range of dangerous goods, such as explosive substances and articles, ammonium nitrate based fertilizers, organic peroxides, and self-reactive and self-heating substances. We can perform every test required to classify dangerous goods for transport into:

- Class 1: explosives, fireworks
- Class 4: flammable solids, self-reactive and self-heating substances
- Class 5: oxidizers and organic peroxides
- Class 9, in part: fertilizers, airbags

Self-heating substances

Products that combine organic fibres and oily substances may self-heat by oxidation when stored or transported at elevated, or sometimes ambient, temperatures. This can lead to fire and loss of product and facilities. We determine self-heating behaviour with dedicated test methods. Examples are fish meal, seed cake and sewage sludge.

Ammonium nitrate based fertilizers

Depending on behaviour and composition, ammonium nitrate based fertilizers (ANBF) are classified as hazardous. High-AN fertilizers on the European market must pass a detonation test and an oil retention test under EU rules. We run these tests efficiently and at short notice, and we also calculate safety distances for storage facilities. See our dedicated AN leaflet.

Organic peroxides and self-reactive substances

Organic peroxides (with an R-O-O-R' group in the molecule) can be detonable and thermally unstable. Their classification requires tests that only a few specialized laboratories can complete. We perform every required test, and developed some of the mandatory, internationally recognized tests ourselves. The same procedures apply to self-reactive substances, such as many organic nitro and azo compounds.

Fireworks and airbags

We are authorized to test and classify fireworks for professional and consumer use. We run large-scale fire engulfment tests on fireworks and on items such as airbags, as well as the full test set for explosive substances and articles. See our explosives leaflet.

TNO and dangerous goods

- An independent, not-for-profit contract research laboratory with over 60 years in explosion safety and hazardous chemistry.
- Many of the required international tests were originally developed by TNO.
- Facilities, including large-scale test sites, for the complete classification of dangerous goods.
- TNO experts take part in international bodies, including the UN Committee of Experts in Geneva, which sets the worldwide basis for classification.
- TNO is the Dutch competent authority (ADR/RID/ADN) for classifying explosives, self-reactive substances, organic peroxides and some fertilizer types.
- Expertise across production, processing, storage and transport.

Shaping the rules

Besides testing, we help develop new regulations and test methods, take part in international expert groups, and work with research and test institutes worldwide. This keeps us at the front of new developments, to the benefit of our clients.

Working with us

We know the test and criteria standards for handling, transport and classification of hazardous materials, and the background behind them. We run the tests efficiently at short notice and provide advanced chemical safety studies for all kinds of industries. Working with us is simple: contact us, and our specialists will discuss how to answer your question.

About TNO Process Safety Solutions

Understanding how a dangerous substance behaves is the basis of safe and efficient production, storage, transport and use. TNO helped develop many tests and criteria for hazardous chemicals, and our "Coloured Books" are used worldwide as reference material in safety studies and software models.

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