

Don't Give Chromium(VI) a Chance

Detecting | Mastering | Preventing

Chromate in the Engine Compartment: Chromium(VI) Compounds on Exhaust-Carrying Components of Vehicle Engines during Maintenance, Repair, Reconditioning and Disposal

To car and commercial vehicle workshops, construction and agricultural machinery service, reconditioners of turbochargers, particulate filters and SCR systems, used parts trade, vehicle recyclers, waste disposal companies and occupational safety specialists

1. Occasion

In recent years, engine and vehicle manufacturers as well as suppliers have issued service information on carcinogenic chromium(VI) compounds that form on exhaust-carrying components during operation. The reports concern passenger cars and vans as well as commercial vehicles, construction machinery, industrial and marine engines.

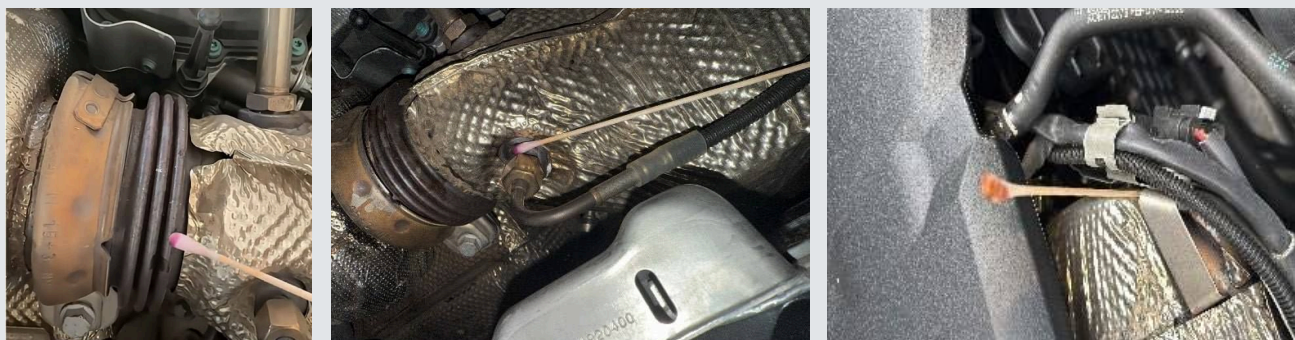
Affected are turbochargers, exhaust manifolds, EGR valves and EGR coolers, catalytic converters, diesel particulate filters, SCR systems, exhaust pipes and the associated flanges, clamps, sensors and screw connections. Exposure is possible wherever these components are touched, loosened, removed, stored, cleaned or taken apart. This applies to the workshop that removes the component as well as to the company that takes it over as a used part, reconditions it or disposes of it.

2. Formation

When exhaust-carrying chromium-alloyed components come into contact with calcium-containing materials at operating temperatures from approx. 300 °C, calcium chromate (CaCrO_4) forms under the influence of atmospheric oxygen. Materials containing sodium oxide form sodium chromate (Na_2CrO_4) in the same way. There are three sources of calcium in the engine compartment:

- **Heat shields and insulation mats** on manifolds, turbochargers, exhaust pipes and exhaust aftertreatment, as well as glass or basalt fibre tapes wrapped around exhaust pipes.
- **Gaskets** on exhaust flanges, turbocharger and manifold connections.
- **Assembly pastes** (anti-seize) on bolts, nuts and flange connections.

The reaction takes place during normal operation. It requires neither a defect nor a maintenance error. Chromium(VI) compounds are carcinogenic, absorbed through the skin and skin-sensitising (H350, H317) as well as chronically hazardous to the aquatic environment with long-lasting effects (H410).

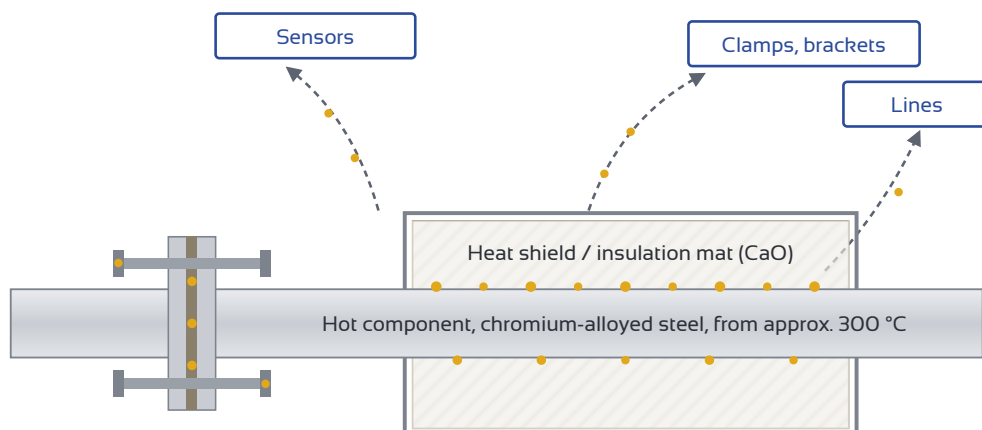


Positive chromium(VI) rapid tests in the engine compartment of passenger cars: expansion joint on the exhaust pipe, flange area below the heat shield, exhaust pipe next to lines and brackets.

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Three sources of calcium and the path of the chromate in the engine compartment (schematic)



Gasket between the flanges
Assembly paste on bolts and nuts

Interface insulation / steel: where chromate forms
Secondary distribution of dust and fibres in the engine compartment

Chromate ●

Chromium-alloyed steel 1

Manifold, turbocharger,
exhaust pipe, housing of
exhaust aftertreatment

Calcium or sodium oxide 2

from insulation, gasket or
assembly paste

Oxygen 3

from ambient air, plus
humidity

Temperature 4

from approx. 300 °C in
normal driving

When all four conditions coincide, chromate forms. On exhaust-carrying chromium-alloyed components with calcium-containing materials, they are met during operation.

3. Situation under TRGS 561

The German Technical Rule for Hazardous Substances TRGS 561 "Activities involving carcinogenic metals and their compounds", version of 4 May 2026, describes thermally stressed chromium-alloyed industrial components in section 5.9.3: chromium(VI) compounds can form on such components and be deposited in insulation materials or assembly pastes. During dismantling and maintenance, exposure of employees cannot be ruled out.

Influencing factors according to TRGS 561 section 5.9.3 are the steel temperature, the chromium content of the alloy, the reaction time, alkali and alkaline earth metal oxides from insulation materials or assembly pastes, and atmospheric oxygen and humidity. Insulation containing calcium oxide can form calcium chromate, mineral wool containing sodium oxide can form sodium chromate.

In its technical publication "Possible chromium(VI) exposure" (as of 3 August 2026), the BG ETEM (German statutory accident insurance for energy, textiles, electrical and media products) states: "According to current knowledge, all industries in which the above-mentioned influencing factors apply may be affected by the problem." These factors, chromium-alloyed steel, high steel temperature, oxides containing alkali and alkaline earth metals from insulation and assembly pastes, and oxygen and humidity, are present in the exhaust line of vehicle engines. Quotations from German sources are our translations.

Measurements in practice

The occupational health service of Alpes-Maritimes (AMETRA06) took air, surface and urine samples in a company that services diesel engines of boats, ships and land vehicles (INRS, Références en Santé au Travail No. 183, September 2025). Chromium(VI) was found on the exhaust manifold, on the turbocharger and in the largest quantity on the bolt at

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the turbocharger outlet, and after dismantling also on the mechanics' hands, although they wore gloves. Chromium(VI) was also detected on boat engines that the company had considered uncontaminated. The in-house colour test on the turbocharger remained negative despite 869 ng chromium(VI).

4. Why so many engine compartments are affected

Series materials. Calcium-containing insulation materials, gaskets and assembly pastes are widespread across manufacturers, model series and vehicle classes and are still being installed in current production. In every vehicle with these materials, chromate forms during normal operation or at least cannot be ruled out; the number of affected vehicles grows with every new registration.

Distribution beyond the component. The chromates do not stay where they form. Dust and fibres come loose from the interface between insulation and hot component and from heat shields that are not completely closed, spread with the heat flow in the engine compartment and are deposited on flanges, clamps, sensors, lines and adjacent surfaces. Uncontaminated fibres that settle on uninsulated hot components form chromate there in turn. Through fibre release and turbulence, chromium(VI) compounds form and are deposited, also far away from the calcium-containing parts and in areas considered uncontaminated. The French study (section 3) found exactly this on boat engines.

Hardly recognisable. Fully developed chromates appear as yellowish to greenish-yellow deposits, especially on stainless steel and in the flange area. However, chromate-containing dust can also be whitish and then looks like ordinary dirt. Appearance is a possible indication, but not an exclusion criterion.

5. What the manufacturers report

The following service information and technical notes from manufacturers are available:

Issued by	Date	Key statements
Engine manufacturer (commercial vehicles, off-road, power, marine)	12/2023	Calcium chromate on the exhaust tract, exhaust aftertreatment as well as insulation and heat protection due to chromium-containing stainless steels in contact with calcium-containing insulation materials or anti-seize pastes above 300 °C. Protective measures during repair and maintenance, no blowing off, industrial vacuum cleaner. Only calcium-free assembly pastes are permitted for assembly work.
Gasket and insulation manufacturer	01/2024	Confirms calcium oxide in its own textile insulation materials. Names calcium-containing lubricants on chromium-alloyed high-temperature flange connections as a cause. Special protective measures and disposal instructions during dismantling and overhaul.
Manufacturer of exhaust aftertreatment	02/2025	Formation on stainless steel exhaust systems, heat shields and insulation materials. Hazard during assembly, dismantling, maintenance and recycling at the end of service life. P3 respiratory protection, disposable coveralls, HEPA vacuum cleaner, damp wiping, disposal as hazardous waste. Recommendation of calcium-free assembly pastes and adaptation of the risk assessment.
Passenger car and van manufacturer	08/2025	All models affected; the problem is explicitly described as industry-wide. Contamination must always be assumed as long as it has not been ruled out by an approved test method. Affected are, among others, heat shields, manifolds, turbochargers, EGR, catalytic converters, DPF, SCR, silencers and clamps. P3/FFP3 respiratory protection, protective suit type 5/6, nitrile gloves, safety goggles, no compressed air, occupational medical care (G 15). For return or scrapping, components must be neutralised and visibly labelled.

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6. What this means for workshops

The decisive basis for protective measures in the company is TRGS 561. It is not linked to mileage, but to the coincidence of the influencing factors; on exhaust-carrying chromium-alloyed components with calcium-containing materials, this coincidence is given.

Anyone working on the engine and the connected hot components may be working in an area contaminated with chromium(VI). Typical activities with possible exposure:

- Replacing turbocharger, exhaust manifold and manifold gaskets
- Working on EGR valve and EGR cooler
- Removing and installing DPF, catalytic converter and SCR system
- Replacing lambda, temperature, pressure and NO_x sensors in the exhaust line
- Loosening clamps, flanges and screw connections
- Removing and refitting heat shields and insulation mats
- Working on the exhaust system from below on the vehicle lift
- Cleaning the engine compartment and the removed parts

Legal classification

- TRGS 561 section 5.9.3 in conjunction with sections 4.1 and 4.2, and the minimisation requirement under § 7 GefStoffV (German Hazardous Substances Ordinance).
- Extend the risk assessment to chromium(VI) on exhaust-carrying components; examine substitution and process changes under § 6 GefStoffV and TRGS 600 (insulation materials, gaskets and assembly pastes free of calcium and sodium oxide).
- Exposure register under § 10a GefStoffV for employees for whom exposure to category 1A or 1B carcinogens cannot be ruled out.
- Examine occupational medical care under ArbMedVV (Ordinance on Occupational Health Care) if repeated chromium(VI) exposure cannot be ruled out.

This text does not replace a company-specific risk assessment.

7. Protective measures in workshops and reconditioning

Recommended measures as soon as chromium(VI) contamination is present or cannot be ruled out:

- Do not stir up dust: do not blow off with compressed air, do not brush or sweep dry. Collect dust before and after dismantling with a dust extractor of dust class H, wipe surfaces damp.
- Respiratory protection at least FFP2 for short-term activities, FFP3 or half mask with P3 filter for longer activities and overhead work.
- Nitrile gloves or nitrile-coated assembly gloves, safety goggles, disposable protective suit with hood for dusty work. Do not reuse used gloves and masks.
- Do not eat, drink or smoke in the work area. Wash hands thoroughly before breaks and after work, change soiled work clothing immediately and do not take it home.
- Place removed components in closable, labelled containers or plastic bags with minimal dust. Dispose of contaminated protective equipment, cleaning cloths and filters as hazardous waste.
- Use only calcium-free assembly pastes and gaskets during assembly; instruct employees.

8. Reconditioning, regeneration, used parts trade and disposal

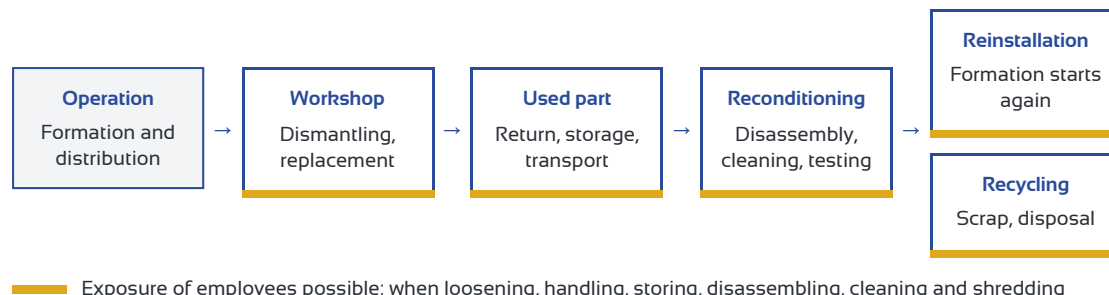
The chromate leaves the workshop with the removed component. Every used turbocharger, particulate filter, catalytic converter, SCR module or manifold that is returned as a used part, traded, reconditioned or recycled can carry the

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contamination into the next company without it being mentioned in the accompanying documents.

The path of the component and the stations of possible exposure



In reconditioning and recycling companies, exposures occur at different points than in the workshop:

- **Goods receipt and storage:** used parts in mesh boxes and cartons, loose dust and fibre residues from heat shields, abrasion during handling.
- **Disassembly:** loosening seized flanges, clamps and screw connections, removing insulation mats and fibre tapes.
- **Cleaning:** blasting, brushing, blowing off and thermal processes on outer surfaces, flanges and insulation release chromate dust. Washing and rinsing water as well as blasting media absorb chromium(VI).
- **End-of-life vehicle recycling:** in authorised dismantling facilities (vehicle recyclers), turbochargers, manifolds, catalytic converters and particulate filters are removed and sold as used parts or sent for recycling. Chromate dust can be released when cutting out components, when opening catalytic converters and particulate filters for precious metal recovery and in the shredder plant. Components sold as used parts reach the next workshop contaminated.
- **Recycling:** shredding, sorting and loading of chromate-contaminated components.

Vehicle manufacturers already explicitly require treatment and visible labelling of components for return and scrapping; manufacturers of exhaust aftertreatment explicitly name recycling at the end of service life as an exposure phase. In our assessment, the reuse of chromate-contaminated components may constitute a use subject to authorisation under REACH (EC) 1907/2006.



Typical used parts from the exhaust line; yellowish deposits on the particulate filter; sensor with deposits on the insulated exhaust pipe.

9. Storage, environmental protection and disposal

- **Storage of removed parts:** removed exhaust components remain a source of chromium(VI) in storage as well. They must be stored in closed, labelled containers on an impermeable surface and protected from the weather. Chromates are water-soluble; when stored outdoors, rain can wash them out and carry them into soil and sewers.
- **Handling in storage:** moving, sorting and loading stored used parts is an activity with possible exposure and belongs in the risk assessment, even if no work is done on the part itself.
- **No discharge into sewers, wash bays or oil separators:** collect cleaning residues, rinsing water and blasting media separately.

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- **Disposal:** dispose of contaminated components, protective equipment, cloths and filters as hazardous waste. The chromium(VI) compounds named here are classified as chronically hazardous to the aquatic environment with long-lasting effects (H410) and must not be released into the environment.

10. Decontamination

Vehicle manufacturers explicitly point out that a treated component is no longer considered decontaminated ("neutralised") after renewed thermal stress.

Decontamination, often incorrectly called "neutralisation", only ever works for the work process taking place, but does not prevent chromates from forming again after this treatment, because the calcium-containing insulation layer remains in the vehicle. This could only be prevented if the calcium-containing insulation parts were substituted; however, no workshop that depends on a manufacturer can arrange this on its own.

The company Kavarmat® has developed a redox system comprising a decontamination spray and decontamination wipes, and offers the decontamination of components sent in, including subsequent chromium(VI) testing according to the patented method of the recognised testing laboratory SEEF B.V.

11. Forwarding

Please forward internally to management, workshop and operations management, occupational safety specialist, company doctor, environmental officer as well as goods receipt and storage.

References:

TRGS 561, version 4 May 2026, sections 3.3.4 and 5.9.3 [4.1 and 4.2]

TRGS 400, 401, 402, 500, 600, 910; GefStoffV §§ 6, 7, 10a; ArbMedVV; REACH (EC) 1907/2006

BG ETEM, technical publication "Mögliche Chrom(VI)-Exposition", as of 3 August 2026

INRS, Références en Santé au Travail No. 183 (2025), TF 329

Service information and technical notes from engine, vehicle, gasket and insulation manufacturers

Kind regards

Markus Sommer

The Chromate Expert

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