CODE OF PRACTICE

Industrial Equipment for Storing and Applying Concrete Release Agents

2nd Edition, May 2017

DEUTSCHE BAUCHEMIE

INTRODUCTION

This Code of Practice "Industrial Equipment for Storing and Applying Concrete Release Agents" was written to provide useful information on selecting suitable technical equipment for storing and applying concrete release agents safely. It was prepared by Deutsche Bauchemie e.V.'s Work Group 2.3 "Concrete Release Agents" and discussed and adopted by Committee 2. In addition to the State-of-the-Art Report "Concrete Release Agents and the Environment", it is intended to provide information for member companies as well as the specialised public.

INDUSTRIAL EQUIPMENT

STORAGE TANKS AND SECONDARY CONTAINMENT DEVICES FOR CONCRETE RELEASE AGENTS

Concrete release agents used in the concrete processing industry are stored in different containers.

It is important that concrete release agents are stored safely in compliance with regulations.
When selecting storage tanks and secondary containment devices in Germany, they must comply with the requirements set out in the Water Management Act (WHG) and be approved in compliance with the Ordinance on Industrial Safety and Health (BetrSichV). When storing solvent based release agents, requirements concerning explosion protection must also be fulfilled and special measures taken. Measures and regulations for combustible liquids are documented in the Technical Rules for Hazardous Substances (TRGS), especially in TRGS 510, as well as the Technical Rules for Industrial Safety (TRBS). The measures to be taken will depend on hazard class, quantity of stored liquid as well as the place and type of storage. Among these measures are, for example: fire resistant or fire-proof partition walls, ventilation, prevention of electrostatic charges as well as explosion protected electrical installations.

The storage of liquid and solid hazardous substances and thus also solvent based concrete release agents in stationary containers (tanks) as well as filling and unloading stations for portable containers (drums / IBCs) is described in detail in TRGS 509.

The purpose of secondary containment devices is to prevent concrete release agents from reaching surface water or the ground. Drains are not permitted in containment rooms for solvent based concrete release agents. In the case of concrete release agents with a flash point below 55 °C, containment basins must be open at the top to ensure adequate ventilation. Proper use of storage containers includes cleaning and servicing on a regular basis.

SPRAYING EQUIPMENT

When selecting spraying equipment, it is important that the equipment used is made entirely of suitable materials, i.e. the equipment should be resistant to the release agents normally used. Spraying equipment that is galvanised on the inside should not be used.

To ensure optimal function, all spraying equipment, regardless of type, should be regularly inspected and cleaned.

- **Pressurised Manual Spraying Equipment**
  Always use oil resistant, high performance spraying equipment. Spraying equipment with stainless steel tanks equipped with a pressure gauge, safety valve, spraying tube holder, pressure relief valve, carrying strap and back support are recommended. Maximum operating pressure is 6 bar (recommended pressure 4–6 bar), capacity is either 5 l or 10 l.

- **Unpressurised Manual Spraying Equipment**
  The use of hand-held equipment with a rotation atomiser allows an especially even spray pattern to be achieved. With this type of spraying equipment, the specified quantity of release agent is added through a valve or pump which allows the flow rate to be adjusted to working speed.
  The combination of fine, even distribution and adjustability allows very economical use of concrete release agents.
  This type of spraying equipment is available from small, flexible, hand-held sprayers with a 1 litre tank all the way to a system with an electric pump and a 10 litre tank backpack.
  Since these sprayers are usually battery-operated, it is important to remember that they should be regularly charged so that they are immediately ready for use the next time they are needed.

STATIONARY SPRAYING FACILITIES

Depending on the width of the surface to be sprayed, stationary spraying facilities operate with 4 to 10 fixed nozzles or 2 to 4 pendulum nozzles.
In newer spraying facilities, nozzle systems that operate on a rotational atomisation principle are used to achieve more economical application. Due to the uniform size of the drops and application without pressure, aerosol formation from release agents in breathing air is reduced. In any case, the application rate should be set for the recommended quantity of release agent per unit surface area. In some cases, it may be necessary to change the nozzle's angle of inclination or adjust volume flow to achieve optimal wetting.

When spraying surfaces, overlapping should be avoided to prevent excessive quantities of release agent locally since the overlapped area on the surface of the concrete may then have a different colour.

SPECIAL SPRAYING EQUIPMENT

Once in awhile, spraying equipment (spray guns) that was originally intended for paints/lacquers is used to apply concrete release agents. Spraying takes place either compressed air-assisted or without pressure (airless).
Compressed air-assisted spraying is carried out at a pressure of approximately 10 bar (minimum pressure 4 bar). The concrete release agent and compressed air are conveyed to the spray nozzle. As the compressed air exits the spray nozzle it expands, losing speed in the process, which creates a vacuum around the jet of material being sprayed. As the material leaves the nozzle, it expands. Expansion increases due to the vacuum and the sprayed material disintegrates into very small droplets.
Airless spraying equipment works with very high pressure of up to approximately 200 bar. Under these circumstances, the concrete release agent is conveyed to a very narrow nozzle. The release agent exits the nozzle at high speed and the free jet of material disintegrates into the finest particles due to the resistance of air. These particles are further transported by the remaining energy as a widening jet of spray.

Even solvent-free, highly viscous, oil-based concrete release agents can be applied very thinly and evenly with this type of spraying equipment. However, the formation of sprayed mist will most likely increase, depending on conditions.

HOSES AND SEALS

To ensure that there are no malfunctions when working with concrete release agents, it is essential to use hoses and sealing materials that are suitable for these types of applications. The manufacturers of the hoses and seals should always be consulted first.
Not just any kind of "rubber" will do. High quality hoses and sealing materials that are resistant to different kinds of mineral oils, hydrocarbon solvents and ester oils must be used when working with concrete release agents, i.e. they should not dissolve, swell, or become brittle, etc. when they come in contact with these substances.

Devices used for applying should therefore be equipped with hoses and sealing materials that are made of resistant elastomers. Also remember that these hoses are under pressure when in use which makes fabric reinforcement necessary.
It should also be mentioned that hoses and sealing materials are subject to natural ageing processes through the effects of ultra violet light and ozone. These parts should be replaced after they have been in use for a longer period.
Concrete release agents on an ester oil base can strongly attack elastomers and often only hoses made of fluorinated rubber (FKM) or multi-layered hoses with an interior lining made of this material provide sufficient resistance. As a rule, seals made of FKM (e.g. Viton®) are also very suitable.

NOZZLES

When using spraying equipment, the selection of the right nozzle and maintenance of constant pressure are of central importance to achieve a good spraying pattern.
Manufacturers and suppliers of concrete release agents recommend special types of nozzles for their products such as flat-fan nozzles or rotating nozzles, the geometries of which (including flow rate and spraying angle) are coordinated to the concrete release agent. The nozzle body should be equipped with a filter to prevent the nozzle mouthpiece (the actual nozzle) from clogging. Nozzle mouthpieces made of stainless steel are recommended for hand-held spraying equipment to minimise the risk of damage. Concrete release agents cannot be properly applied with defective nozzle mouthpieces.

PERSONAL PROTECTIVE EQUIPMENT

Due to the ingredients used, concrete release agents fall under areas that are governed by regulations concerning the environment and occupational health and safety.
When using concrete release agents, contact with skin should be prevented by wearing suitable work clothes and oil resistant, protective gloves. Release agents splashed into eyes may cause irritation, so protective glasses should always be worn. Along with general hygiene measures, a number of technical and organisational protection measures should also be taken.
Further information and notes on this are found in the State-of-the-Art Report "Concrete Release Agents and the Environment" (4th Edition, June 2015) published by Deutsche Bauchemie.

SUPPLIERS AND MANUFACTURERS

In the following you will find a brief list of several suppliers and manufacturers:

CONTAINERS AND SECONDARY CONTAINMENT DEVICES

Sources:

BBTec Industrietechnik
Vertrieb GmbH
Rathausplatz 4
09235 Burkhardtsdorf
Telephone +49 (0) 37 21 8 67-43
Telefax +49 (0) 37 21 8 67-41
www.gefahrstoffe-lagern.de

CEMO GmbH
In den Backenländern 5
71384 Weinstadt
Telephone +49 (0) 71 51 96 36-0
Telefax +49 (0) 71 51 96 36-98
www.cemo.de

Dehoust GmbH
Gutenbergstraße 5-7
69181 Leimen
Telephone +49 (0) 62 24 9702-0
Telefax +49 (0) 62 24 97 02-70
www.dehoust.de

Schütz GmbH & Co. KGaA
Schützstraße 12
53242 Selters
Telephone +49 (0) 26 26 77-0
Telefax +49 (0) 26 26 77-5 32
www.schuetz.net

MOBILE AND STATIONARY SPRAYING EQUIPMENTS AND FACILITIES

Sources:

Avermann Machinenfabrik
GmbH & Co. KG
Lengericher Landstraße 35
49078 Osnabrück
Telephone +49 (0) 54 05 505-0
Telefax +49 (0) 54 05 6441
www.avermann.com

BM Anlagenbau und
Dosiertechnik GmbH
Werftstr. 11
31789 Hameln
Telephone +49 (0) 51 51-9 96 96 85
Telefax +49 (0) 51 51-9 96 96 89
www.bm-anlagenbau.com

EBAWE Anlagentechnik GmbH
Dübener Landstraße 58
04838 Eilenburg
Telephone +49 (0) 34 23 6 65-0
Telefax +49 (0) 34 23 6 65-200
www.ebawe.de

Finke GmbH
Niemeierstraße 14
32758 Detmold
Telephone +49 (0) 5231 9152-0
Telefax +49 (0) 68266
www.finke.com

GLORIA GmbH
Diestedder Straße 39
59321 Wadersloh
Telephone +49 (0) 25 23 77-0
Telefax +49 (0) 25 23 77-120
www.gloria.de

Wilhelm Keller
GmbH & Co. KG
Herdweg 1
72147 Nehren
Telephone +49 (0) 7473 9449-0
Telefax +49 (0) 7473 9449-49
www.oilpress-keller.de

MANTIS ULV –
Sprühgeräte GmbH
Vierlander Straße 11 a
21502 Geesthacht
Telephone +49 (0) 4152 / 8459-0
Telefax +49 (0) 4152 / 8459-11
www.mantis-ulv.com/en

MESTO Spritzenfabrik
Ernst-Stockburger GmbH
Ludwigsburger Str. 71
71691 Freiberg a.N.
Telephone +49 (0) 71 41 2 72-0
Telefax +49 (0) 71 41 2 72-100
www.mesto.de

NUSPL Schalungsbau
GmbH & Co. KG
Alte Kreisstraße 42
76149 Karlsruhe
Telephone +49 (0) 721 7080 0
Telefax +49 (0) 721 7080 70
www.nuspl.com

Vollert Anlagenbau GmbH
Stadtseestraße 12
74189 Weinsberg
Telephone +49 (0) 71 34 52-0
Telefax +49 (0) 71 34 52-203
www.vollert.de

J. Wagner GmbH
Otto-Lilienthal-Str. 18
88677 Markdorf
Telephone +49 (0) 7544-505-0
Telefax +49 (0) 7544-505-200
www.wagner-group.com

Weckenmann Anlagentechnik
GmbH & Co. KG
Birkenstraße 1
72358 Dormettingen
Telephone +49 (0) 74 27 94 93-0
Telefax +49 (0) 74 27 94 93-29
www.weckenmann.com

NOZZLES

Sources:

Düsen-Schlick GmbH
Hutstraße 4
96253 Untersiemau / Coburg
Telephone +49 (0) 95 65 94 81-0
Telefax +49 (0) 95 65 28 70
www.myschlick.com

Lechler GmbH
Ulmer Straße 128
72555 Metzingen
Telephone +49 (0) 7123-962-0
Telefax +49 (0) 7123-962-444
www.lechler.de

MANTIS ULV –
Sprühgeräte GmbH
Vierlander Straße 11 a
21502 Geesthacht
Telephone +49 (0) 4151 / 8459-0
Telefax +49 (0) 4152 / 8459-11
www.mantis-ulv.com/en

Spraying Sytems
Deutschland GmbH
Großmoorkehre 1
21079 Hamburg
Telephone +49 (0) 40 76 60 01-0
Telefax +49 (0) 40 76 60 01-233
www.spray.de

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Deutsche Bauchemie e. V.
Mainzer Landstr. 55
60329 Frankfurt am Main
Telephone + 49 (0)69 - 25 56 -13 18
Telefax + 49 (0)69 - 25 56 -13 19
www.deutsche-bauchemie.de

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