

Exemption Request Form

Date of submission: 26.04.2021

1. Name and contact details

1) Name and contact details of applicant:

Company: Netzsch Gerätebau GmbH Tel.: +49 9287 881 164
Name: Roman Eiswert E-Mail: roman.eiswert@netzsch.com
Function: Material Compliance Address: Wittelsbacherstraße 42
95100 Selb - Germany

2) Name and contact details of responsible person for this application (if different from above):

Company: _____ Tel.: _____
Name: _____ E-Mail: _____
Function: _____ Address: _____

2. Reason for application:

Please indicate where relevant:

- Request for new exemption in: Annex IV
 Request for amendment of existing exemption in
 Request for extension of existing exemption in
 Request for deletion of existing exemption in:
 Provision of information referring to an existing specific exemption in:
 Annex III Annex IV

No. of exemption in Annex III or IV where applicable: _____

Proposed or existing wording:

Mercury in melt pressure transducers for capillary rheometers at temperatures over 300°C and pressures over 1000 bar

Duration where applicable: 7 years (according to Article 5 (2) RoHS-directive)

Other: _____

3. Summary of the exemption request / revocation request

Capillary rheometers are analytic devices that allow to determine the viscosity of materials, such as polymer melts, oils or pasty foodstuff, as a function of temperature and shear rate. The results are particularly well suited to predict behavior in high shear rate processes, e.g. extrusion.

Due to their fundamental principle of operation, capillary rheometers require *melt pressure transducers* as an essential component.

This kind of pressure sensor has widespread use also within production processes, namely extruders. These components are thus commercially available from various suppliers. Depending on the material to be investigated or processed, a melt pressure transducer with appropriate pressure and temperature range must be chosen.

The common principle of this kind of transducers is to retrieve the pressure within the liquid or pasty sample by means of a membrane. A suitable filling fluid within a capillary then transmits the pressure to the actual sensing element, which converts pressure to an electrical signal by means of a strain gauge. This electrical signal then undergoes further treatment in a separate, application-dependent electronic setup.

The transducer sold by NETZSCH has to cover a range of up to 440 °C and 2000 bar (30'000 psi). A typical application is to investigate high performance polymers, for instance PEEK (melting temperature 343 °C), under melt processing conditions. For this operation range, there is no commercially available alternative to mercury as a filling material within the melt pressure transducer.

4. Technical description of the exemption request / revocation request

(A) Description of the concerned application:

1. To which EEE is the exemption request/information relevant?

Name of applications or products: capillary rheometers

- a. List of relevant categories: (mark more than one where applicable)

- | | |
|----------------------------|---------------------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 7 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 8 |
| <input type="checkbox"/> 3 | <input checked="" type="checkbox"/> 9 |
| <input type="checkbox"/> 4 | <input type="checkbox"/> 10 |
| <input type="checkbox"/> 5 | <input type="checkbox"/> 11 |
| <input type="checkbox"/> 6 | |

- b. Please specify if application is in use in other categories to which the exemption request does not refer: _____

- c. Please specify for equipment of category 8 and 9:

The requested exemption will be applied in

monitoring and control instruments in industry

in-vitro diagnostics

other medical devices or other monitoring and control instruments than those in industry

2. Which of the six substances is in use in the application/product?

(Indicate more than one where applicable)

Pb

Cd

Hg

Cr-VI

PBB

PBDE

3. Function of the substance:

Transmitting the pressure within the melt pressure transducer.

4. Content of substance in homogeneous material (%weight): 100%

5. Amount of substance entering the EU market annually through application for which the exemption is requested: confidential

Please supply information and calculations to support stated figure.

See confidential file

6. Name of material/component:

Melt pressure transducer in capillary rheometers

7. Environmental Assessment: _____

LCA: Yes

No

(B) In which material and/or component is the RoHS-regulated substance used, for which you request the exemption or its revocation? What is the function of this material or component?

Melt pressure transducer in capillary rheometers – functions see 3.Summary of the exemption request / revocation request

(C) What are the particular characteristics and functions of the RoHS-regulated substance that require its use in this material or component?

Filling fluid in melt pressure transducer in capillary rheometers – functions see 3.Summary of the exemption request / revocation request

5. Information on Possible preparation for reuse or recycling of waste from EEE and on provisions for appropriate treatment of waste

- 1) **Please indicate if a closed loop system exist for EEE waste of application exists and provide information of its characteristics (method of collection to ensure closed loop, method of treatment, etc.)**

The manufacturers mostly take used/old/malfunction melt pressure transducers back.

- 2) **Please indicate where relevant:**

- Article is collected and sent without dismantling for recycling
 Article is collected and completely refurbished for reuse
 Article is collected and dismantled:
 The following parts are refurbished for use as spare parts: _____
 The following parts are subsequently recycled: _____
 Article cannot be recycled and is therefore:
 Sent for energy return
 Landfilled

- 3) **Please provide information concerning the amount (weight) of RoHS substance present in EEE waste accumulates per annum:**

- In articles which are refurbished _____
 In articles which are recycled _____ N/A: number of this transducers used in this exemption which are recycled yearly is very small compared to the number of total transducers used and recycled
 In articles which are sent for energy return _____
 In articles which are landfilled _____

6. Analysis of possible alternative substances

- (A) **Please provide information if possible alternative applications or alternatives for use of RoHS substances in application exist. Please elaborate analysis on a life-cycle basis, including where available information about independent research, peer-review studies development activities undertaken**

For general usage up to measuring ranges 1000 bar and process temperatures up to 538 °C, it is common to use melt pressure sensors with sodium potassium (NaK) filling instead of mercury. Above measuring ranges of 1000 bar the NaK filling is not suitable, as the compressibility of the NaK is too high which results in

an extension of the yield limit of the front diaphragm. The sensor cannot longer meet the specification and gets a pre-damage which causes a short life time. . In comparison, mercury as filling is less compressible, the sensor works appropriate at higher pressure ranges of 1000 bar.

Beside sodium-potassium filling, it is common to use an eutectic mixture of gallium, indium and tin (Galinstan) instead of mercury. The filling Galinstan is just suitable up to approx. 300 °C. At higher temperatures the filling Galinstan reacts with the capillary material, which results in a defect of the sensor.

- (B) Please provide information and data to establish reliability of possible substitutes of application and of RoHS materials in application**

No substitutes available – see summary 6(A)

7. Proposed actions to develop possible substitutes

- (A) Please provide information if actions have been taken to develop further possible alternatives for the application or alternatives for RoHS substances in the application.**

Further alternative filling materials which are suitable in combination of high temperatures (>350°C) and pressure (>1000 bar) are not available.

- (B) Please elaborate what stages are necessary for establishment of possible substitute and respective timeframe needed for completion of such stages.**

N/A

8. Justification according to Article 5(1)(a):

(A) Links to REACH: (substance + substitute)

1) Do any of the following provisions apply to the application described under (A) and (C)?

Authorisation

SVHC

Candidate list

Proposal inclusion Annex XIV

Annex XIV

Restriction

Annex XVII: Entry 18a: not for electronics/electrical items

Registry of intentions

Registration: Provide REACH-relevant information received through the supply chain.

Direct supplier is not registered (< 1t/a), but there are 2 official registries

Name of document: Registrations:

Mercury - Registration Dossier - ECHA (europa.eu)

Mercury - Registration Dossier - ECHA (europa.eu)

(B) Elimination/substitution:

1. Can the substance named under 4.(A)1 be eliminated?

Yes. Consequences? _____

No. Justification: Melt pressure transducers need a fluid filling for transmitting the pressure.

2. Can the substance named under 4.(A)1 be substituted?

Yes.

Design changes:

Other materials:

Other substance:

No.

Justification: Substitutes cannot be used at this specific temperature/pressure – See 6. (A)

3. Give details on the reliability of substitutes (technical data + information):

No substitutes with required attributes available

4. Describe environmental assessment of substance from 4.(A)1 and possible substitutes with regard to

- 1) Environmental impacts: _____
- 2) Health impacts: _____
- 3) Consumer safety impacts: _____

Impacts of Hg are already well known – but there are no alternatives for this specific application.

⇒ Do impacts of substitution outweigh benefits thereof?

Please provide third-party verified assessment on this: _____

There are no available substitute for this substance, there for an exemption is needed.

(C) Availability of substitutes:

- a) Describe supply sources for substitutes: No availability
- b) Have you encountered problems with the availability? Describe: No substitutes with required attributes available
- c) Do you consider the price of the substitute to be a problem for the availability?
 Yes No
- d) What conditions need to be fulfilled to ensure the availability? _____

(D) Socio-economic impact of substitution:

⇒ What kind of economic effects do you consider related to substitution?

- Increase in direct production costs
- Increase in fixed costs
- Increase in overhead
- Possible social impacts within the EU
- Possible social impacts external to the EU
- Other: No possibility to substitute. See summary 6. (A)

⇒ Provide sufficient evidence (third-party verified) to support your statement: _____

9. Other relevant information

Please provide additional relevant information to further establish the necessity of your request:

Today mercury filled melt pressure transducers are already used in other machines like extruders, which are excluded from the RoHS directive (large scale). With capillary rheometers you are able to control/check the quality of your process before using the large scale extruders, therefore save resources and power. The number of additional mercury filled pressure transducers, which will enter the market because of this exemption, compared to the already used ones is significantly less.

Capillary rheometers are used in specific professional fields of work only and are not easily movable. Therefore, they are comparable with large scale tools, which are excluded from the RoHS-directive.

Companies outside the EU can already use this kind of transducers in their rheometers which is a competitive advantage compared to EU-Companies.

10. Information that should be regarded as proprietary

Please state clearly whether any of the above information should be regarded to as proprietary information. If so, please provide verifiable justification:

The number of sold pressure transducers is based on confidential company sales data and therefore submitted separately.
