German Environment Agency

As at: 23rd January 2023

INFORMATION

Release of nickel by chrome-plated drinking water taps and other components

Version 2

Amendments:

Clarification of how angle valves are to be assessed

Withdrawal of the reference to standard DIN 50930-6

Umweltbundesamt
Section II 3.4
Heinrich-Heine-Str. 12
08645 Bad Elster
www.umweltbundesamt.de

Release of nickel by chrome-plated drinking water taps and other components

Kitchen and sanitary taps or other components such as angle valves are plated by nickel-containing layers for optical and corrosion protection reasons. Thereby the basic body consisting of a copper alloy is plated with nickel and subsequently with chrome. Depending on the production process it cannot always be avoided that nickel will also be precipitated on the internal surfaces coming into contact with drinking water. Products with nickel-containing platings may release nickel into drinking water. High nickel concentrations are to be detected notably in the first 0.2 litres after a long residence time of water in these taps or fittings. This release of nickel is most frequently the reason for the limit of nickel of 20 µg/l of the German Drinking Water Ordinance being exceeded in the so-called S1 sample. For this purpose, one litre is taken off after 4 hours of residence time in conformity with the recommendation of the German Environment Agency "Evaluation of Drinking Water Quality with Respect to the Parameters Lead, Copper and Nickel".

For the time being, the release of nickel by chrome-plated taps and fittings is not a test criterion when certifying products. Though a test method exists for the determination of the release of nickel by taps and fittings (DIN EN 16058) standardized on European level, this method is very expensive as each tap has to be tested fivefold for at least half a year. The German Environment Agency together with the DVGW (German Association for Gas and Water) and the manufacturers have developed test criteria for this test which are explained in the Annex.

Unfortunately, it was not possible for furnish proof that similar fittings may be gathered in groups for this test. Thus, each fitting would have to be tested. Yet, this is not implementable owing to cost and effort for the test and the multitude of fittings available on the market. That is why the German Environment Agency some time ago requested the manufacturers to develop a short-time test. However, at present a verified short-time test method is not available and it is not to be foreseen that it will be possible to verify such a method soon.

For these reasons, the German Environment Agency is not in the situation to recommend a specific procedure for testing chrome-plated fittings and components. Solely the manufacturers are responsible to confirm that the nickel limit of the German Drinking Water Ordinance is complied with when using such taps. As an additional difficulty there has to be considered that the locally varying water quality affects the release of nickel.

Not all chrome-plated taps and fittings cause an exceeding of the nickel limit. A possibility to reduce the release of nickel is the so-called „plugging" of the taps and fittings before plating. Thereby all openings of the fittings have to be closed manually. Some manufacturers chrome-plate their fittings in this way. Keeping of the nickel limit may be certified in the framework of a certification procedure for products of manufacturers plugging their taps and fittings. To this end, a tap or fitting is to be chosen as an example which has to be tested according to DIN EN 16058. To ensure a uniform quality of the manufactured products as regards a successful closing a complete monitoring of the production process is required. Keeping of the nickel limit may be also reached by means of other engineering measures. For this reason, it is not possible to prescribe "plugging" as mandatory for a general certification. Testing of nickel release is for example required for sanitary taps in order to obtain the German "Blue Angel" signet. Unfortunately, so far taps marked accordingly are not known to exist.

The German Environment Agency basically recommends to consumers to allow water stagnant for a long time first to run off until it will come cooler from the pipeline. Only this water should

be used for drinking and preparing food. This will distinctly reduce the nickel concentration below the nickel limit of the Drinking Water Ordinance as a rule also for chrome-plated fittings. A replacement of the fittings does not necessarily lead to the goal as also for a certified fitting it is not ensured that the nickel limit will be kept in the case of water being stagnant.

Annex: Test criteria for assessing a test according to DIN EN 16058

Carrying out the test

With the test according to DIN EN 16058 it is possible to determine the release of nickel of chrome-plated components.

The test water has to be suited for this test. Suitable test water is test water 1 according to DIN EN 15664-2. If a different test water is used is must be proven that it is suited e.g. by carrying out a comparative test with test water 1. The pH of the test water has to be < 7.6.

Assessment of the test results

For assessing the outlet taps the reference volume of 1 l of standardized nickel concentration in conformity with DIN EN 16058 is used. For assessing other components a surface share of 10 % (B-factor according to the evaluation criteria for metallic materials in contact with drinking water) is applied:

$$c_n^*(T) = 0{,}1\, c_{EP,n}^*(T)$$

Angle valves are to be assessed as „other components“. The assessment as „drain valve“ is not possible because angle valves are not the only source of nickel in a sample volume of 1 litre (S1 sample).

A sliding mean of 5 consecutive values of T (e.g. T = 12, 13, 14, 15, 16 weeks) is formed for each tap or each test line

$$\bar{c}_n^*(T) = \frac{1}{5}\sum_{m=0}^{4} c_n^*(T+m)$$

with T = time (week) of the first value.

<u>The tap or the other component is considered to be suited as regards drinking water hygiene if</u>

$c_n^*(T) < 40\ \mu g/l$ for all n and T < 12 weeks

and

$\bar{c}^*(T) + 2\sigma(T) < 10\ \mu g/l$ for T ≥ 12 weeks

$$\text{with } \bar{c}^*(T) = \tfrac{1}{5}\sum_{n=1}^{5} \bar{c}_n^*(T) \text{ and } \sigma(T)^2 = \tfrac{1}{4}\sum_{n=1}^{5}\left(\bar{c}_n^*(T) - \bar{c}^*(T)\right)^2$$

or

$c_n^*(T) < 10$ µg/l for T ≥ 12 weeks and all n