

Stainless steel in the BASTA-system and Byggvarubedömningen (BVB)

BASTA and BVB have made a decision allowing exceptions in the assessment requirements of substance levels for stainless steel alloys.

Stainless steels are alloys of the metals iron, chromium, as well as in many cases nickel. Until now stainless steel has failed BASTA and BVB criteria due to a relatively high content of primarily nickel. It is widely recognised that prolonged and repeated exposure to nickel is damaging to health. Nickel may also cause allergic skin reactions and is suspected to have carcinogenic properties.

The Finnish Institute of Occupational Health¹ conducted a literature analysis which reviewed the state of knowledge regarding environmental and health related properties of stainless steel. The study's scientific quality and conclusions have been analysed and confirmed by an independent expert² commissioned by BASTA.

Briefly, conclusions based on current knowledge recognise that stainless steel from a toxicological perspective can be viewed as a separate subject matter, which is assessed by the alloys properties, not by its ingoing metal traits. The European classification legislation (CLP)³ laws concerning alloys also support this conclusion.

Furthermore, the study finds that stainless steel alloys nickel release is considerably lower, in some studies by more than a 1000 times lower than pure nickel. In deduction the stainless steel alloys were found not to be carcinogenic, nor cause allergies, but to have very low toxicity. Various types of stainless steel display different levels of nickel release; however these differences are minor in comparison with the pure metal release. The low release of nickel is due to stainless steels excellent corrosion resistance.

Stainless steel sulphur alloys (noncorrosive machine steel), used for its chip forming properties, exhibits a higher discharge of nickel and an inferior corrosion resistance. The EU recommends against using stainless steel sulphur alloys for applications with continuous skin contact. During the assessment of construction materials containing stainless steel it is important to consider the risk of exposure to nickel even if continuous skin contact does not normally occur.

A condition for BASTA and BVB exemption from subject level assessment is set by the Swedish Chemicals Agency (KEMI) substitution guide PRIO⁴ in defining that stainless steel may not contain substances with phasing out properties. Substances with phasing-out qualities are viewed as unwanted in construction materials regardless of alloys properties, in full accordance with the national environment quality objective "a nontoxic environment".

Consequently, the following alternatives can be used to assess stainless steel to qualify according to BASTA or BVB:

1. The stainless steel grade and standard in question is found in the document "A selection of stainless steel complying with BASTA and BVB properties criteria" from Jernkontoret and the Swedish Institute of Steel Construction.
2. The steel grade or standard does not contain substances with "phasing-out" properties above the criteria specified levels **and** fulfils one a, b **or** c
 - a. the steel grade contains less than 1% nickel
 - or**
 - b. the steel grade contains less than 0,1% sulphur
 - or**
 - c. the nickel discharge in a standardized in vitro test (EN 1811, CEN reference test method) is <0,5ug/cm2/weekly in accordance with CLP

Specific product information can be obtained directly through your supplier of stainless steel.

Please note that the above only applies to the stainless steel and not to any surface coatings. The surface treatment is assessed based on the usual approach in the BASTA system where all constituent substances are included in the assessment and are compared against the BASTA system criteria. The concentrations of the substances included in any surface treatment are calculated in relation to the total weight of the surface-treated component.

Additional information concerning stainless steel is available through Swedish Institute of Steel Construction (Stålbyggnadsinstitutet) or Jernkontoret.

Referenses

1. Santonen, T., Stockmann-Juvala, H., Zittin, A. (2010). Review on toxicity of stainless steel. Finnish Institute of Occupational Health. ISBN 978-952-261-039-3. [Review on toxicity of stainless steel 2010-11-19](#)
2. Jönsson, Anders (2012). Utvärdering av human- och ekotoxikologiska egenskaper hos rostfritt stål. IVL Svenska Miljöinstitutet.
3. European Chemicals Agency, ECHA (2009). Guidance on the Application of the CLP Criteria. [Guidance on the application of the clp criteria](#)
4. The Swedish Chemicals Agency - PRIOguiden – [Prio - Kemikalieinspektionen](#)