



***Food Safety: How to ensure that your food equipment is made of safe and reliable materials***



**The current legislation**

**EC 2006/42    *The Machinery Directive***

**EC 1935/2004    *Materials and Articles in Contact with Food*  
(sometimes known as *The Framework Directive*)**

**852/2004 EC    *Food Hygiene Regulations***



## **The Machinery Directive 2006/42/EC**

### **Machinery is**

**an assembly fitted with a drive system other than directly applied human or animal effort, consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application**

### **Machinery must be**

**designed and constructed in such a way as to avoid any risk of infection, sickness or contagion**

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## **The Machinery Directive 2006/42/EC**

### **Materials must**

**comply with the Framework Directive and must be chosen on the basis of the intended working environment of the equipment**

### **Food contact surfaces must**

**be easily cleaned and disinfected before each use**

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The CE mark is applied by a manufacturer to a piece of equipment to guarantee that it meets all the requirements of the Machinery Directive (and other applicable legislation).

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## The Framework Directive EC 1935/2004

### Food-contact materials must not

- transfer their constituents to food in quantities which could endanger human health
- bring about an unacceptable change in the composition of the food or
- cause a deterioration in its organoleptic characteristics

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## Food Hygiene Regulation EC 852/2004

### A food-business operator must

- ensure food hygiene at all stages of production by taking the measures necessary to control hazards and to ensure the fitness of his food for human consumption
- ensure that all surfaces in contact with food are smooth, washable, corrosion-resistant and made from non-toxic materials
- ensure that all food-contact surfaces are maintained in a sound condition and are easy to clean and disinfect

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	Responsibility of the <b>Equipment Manufacturer</b>	Responsibility of the <b>Food Business Operator</b>
<b>Machinery Directive</b>	<b>1</b>	<b>2</b>
<b>Framework Directive</b>	<b>1</b>	<b>2</b>
<b>Food Hygiene Regulations</b>	<b>2</b>	<b>1</b>

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### “Safe” includes:

- non-toxic
- non-contaminating
- cleanable
- **smooth**

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### “Reliable” includes:

- remaining smooth
- corrosion resistance
- temperature resistance
- wear resistance
- **strength**

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## The selection of safe and reliable materials

- definition, by the food-business operator, of the environment in which the materials are to be used
- appreciation of how candidate materials might behave under those conditions

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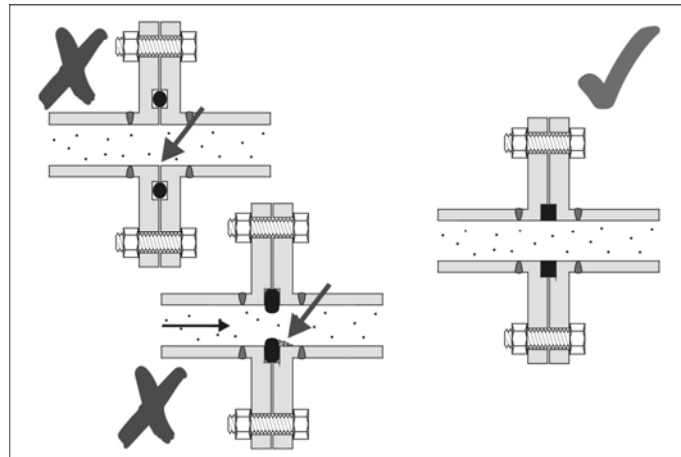


European Hygienic Engineering  
and Design Group

Guideline Document No. 32

***Materials of Construction  
for Equipment in Contact  
with Food***

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## Elastomers

- swelling and shrinkage
- compression set
- **adhesion**

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Elastomer type	Operating range, °C	PROCESS MEDIUM			
		Hot water	Steam (150°C)	Ozone	UV
NBR	-40 to +120	excellent	do not use	poor	excellent
HNBR	-30 to +180	excellent	excellent	excellent	excellent
EPDM	-50 to +150	excellent	excellent	excellent	excellent
Silicone	-60 to +200	excellent	excellent	excellent	excellent
Fluorocarbon	-20 to +200	good	excellent	excellent	excellent
Perfluoroelastomer	-15 to +260	excellent	excellent	excellent	excellent
Cl or Br Butyl	-40 to +150	excellent	excellent	excellent	excellent

Key:	excellent	good	poor	do not use
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## Plastics

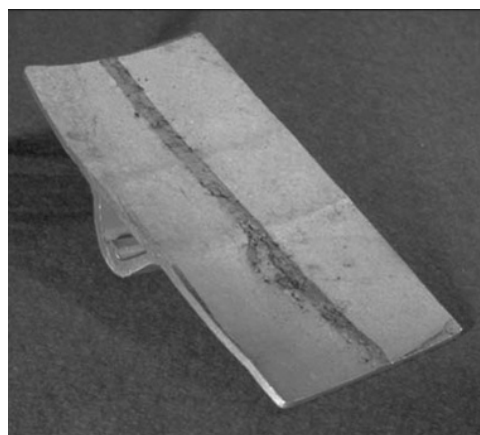
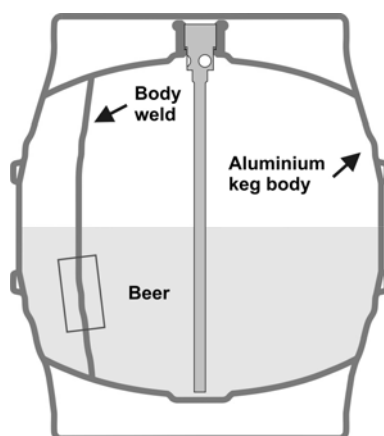
- acidity
- ultra-violet light and ozone
- hydrolysis
- electrostatic charges
- phase changes
- creep
- brittleness
- **abrasion**

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## Metals

- general corrosion
- crevice corrosion
- stress-corrosion cracking
- weld heat-affected zones
- surface finish
- stress and fatigue
- impact
- **porosity**

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Photo: Nickel Institute



Photo: Nickel Institute

### Milk tanker and beer kegs made from an austenitic stainless steel

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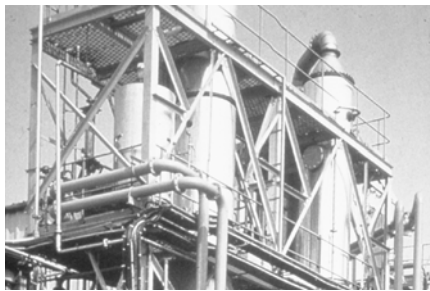


Photo: Nickel Institute



Photo: Nickel Institute

### Austenitic AISI 316 stainless steel - the plant manufactures pectin for jam-making; the bins store meat

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Photo: Dimpleflo

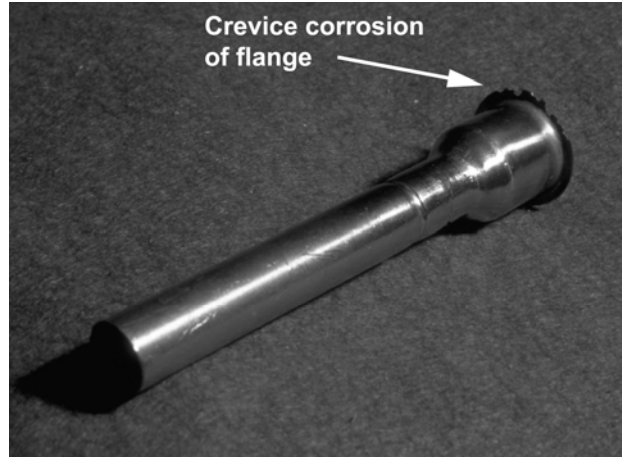
**A duplex stainless steel heat-exchanger used for preparing tomato and barbecue sauces**

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**Soy sauce fermentation tanks made from a super-austenitic stainless steel**

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The flange at the top of this tube simply pressed against a metal bush. The metal-to-metal contact area formed a fine crevice.

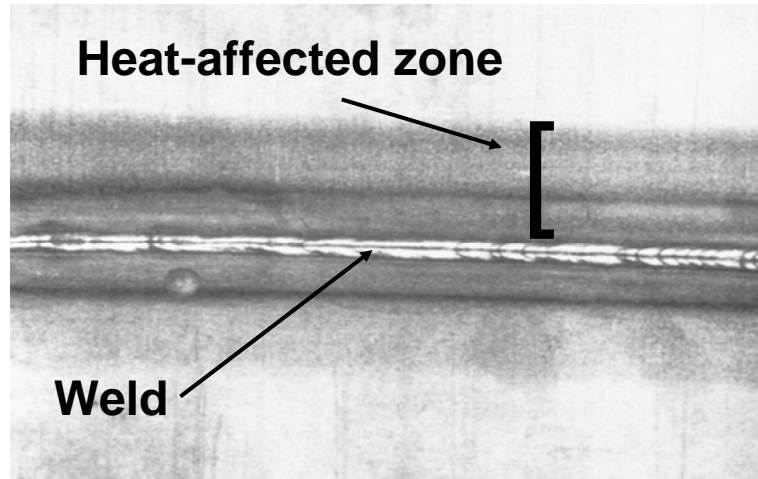
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Test for stress-corrosion cracking

Reproduced by kind permission of Centro Inox, Italy

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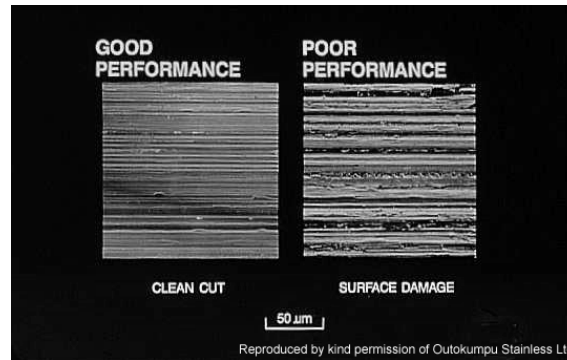
Heat will tint the metal around a weld and also affect its mechanical properties and its corrosion resistance

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**"Large areas of product contact surface should have a surface finish of  $0.8\mu\text{m } R_a$  or better".**

**EHEDG Guideline Document No. 8**

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## Where to go for help

**Nickel Institute**      [www.nickelinstitute.org](http://www.nickelinstitute.org)  
[www.hygienicstainless.org](http://www.hygienicstainless.org)

**Euro Inox**              [www.euro-inox.org](http://www.euro-inox.org)

**EHEDG**                  [www.ehedg.org](http://www.ehedg.org)

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