



Application note



Preventing rust and corrosion in washdown environments



Many regulatory agencies can fine or delay production at facilities containing visible rust or corrosion which can be costly and disrupt productivity.

The challenge:

Maintaining a pristine production area is a challenge in extreme environments, which are often subject to high pressure and hot water cleaning with strong chemical agents.

According to the current Good Manufacturing Practices (cGMPs) and most regulatory inspection agencies around the world, all equipment, including package coders in meat, poultry, dairy and beverage plants, must be free of rust or corrosion in order to prevent potential contamination of products.

This necessitates a careful selection of packaging line equipment that is designed to thrive in these harsh environments. Ingress Protection (IP) is the obvious area of focus to ensure products can withstand washdown procedures. Sometimes overlooked, the materials of construction are equally important to ensure product longevity.

Videojet advantage:

Videojet offers IP rated printers designed to reliably perform in harsh washdown environments. The Videojet 1860 Continuous Inkjet (CIJ) printer offers an IP66 rating while the IP Dataflex Plus Thermal Transfer Overprinter (TTO) provides an IP65 rating option.* Both printer technologies utilise 316 marine grade steel construction to provide a higher level of corrosion protection. This application note explains the advantages of 316 stainless steel construction over the more common 304 grade and offers simple suggestions on proper equipment washdown procedures.

* IP65 rated TTO printer when IP cover is fitted. IP55 rated controller as standard.

The importance of Ingress Protection ratings



Ingress Protection (IP) is an international rating system developed by the International Organisation for Standards (ISO) under IEC 60529 used to indicate how well industrial equipment is protected from dust and liquids. An IP rating consists of two digits: the first digit refers to a system's ability protect against solid objects and dust and the second digit indicates the protection level against liquids, such as those used in a washdown. For instance, a coder that is IP65 rated is fully protected against dust, and against low pressure jets of water. Please refer to table below for an explanation of different ratings.

| Dust protection | | Water protection | |
|-----------------|--|------------------|--|
| First Digit | Definition | Second Digit | Definition |
| 0 | No protection | 0 | No protection |
| 1 | Protection against solid object greater than >50mm | 1 | Protection against dripping water |
| 2 | Protection against solid object greater than >12.5mm | 2 | Protection against dripping water when tilted 15 degrees |
| 3 | Protection against solid object greater than >2.5mm | 3 | Protected against spraying water |
| 4 | Protection against solid object greater than >1mm | 4 | Protected against splashing of water |
| 5 | Protection against dust | 5 | Protected against water jets |
| 6 | Dust tight | 6 | Protected against powerful water jets |
| | | 7 | Protected against water immersion up to 1m |
| | | 8 | Protected against water immersion >1m |
| | | 9k | Protected against powerful high temperature water jets |

Why care about rust or corrosion?

Maintaining a clean and safe production floor is mission-critical for certain producers. Highly regulated industries in most parts of the world are subject to significant regulatory oversight.

In the United States, for example, a USDA inspector can delay production or shut down a plant if rust is merely visible on the manufacturing floor, reducing output and adding significant costs. If a piece of equipment cannot be effectively cleaned and sanitized, a health inspector can place it out of service. Preventing rust and corrosion not only reduces production delays but also minimises recall risk by increasing overall food safety.

Preventing rust and corrosion

When evaluating new equipment purchases, it is important to consider products which will prevent rust or corrosion from contaminating the production environment. Follow these three easy steps to reduce your risk:

1. Evaluate your production environment risk areas

When purchasing new equipment, consider your specific production environment. This includes evaluating each area of the production floor and what environmental changes occur during different shifts.

For example, some areas of a production floor receive more stringent sanitation procedures than others and some might not undergo a washdown cycle at all. Assessing the specific washdown procedures in each area of the production floor will ensure the right equipment fit. Especially if using a third party sanitization company, make sure to evaluate three aspects of the sanitization process: the chemicals used, the pressure and temperature of water, and procedures (frequency, rinsing process and areas cleaned).



2. Buy equipment and accessories suited to your production environment

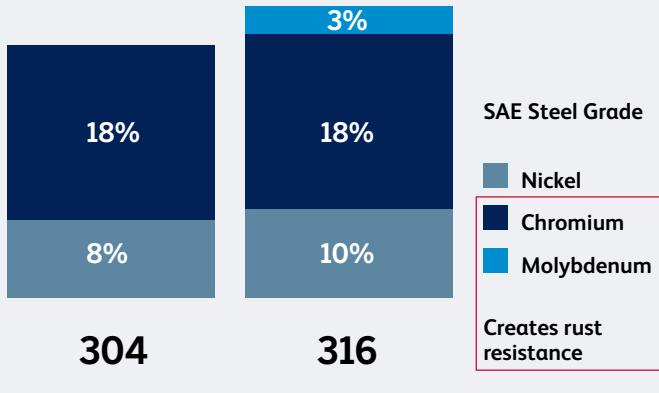
The type of material equipment is made from is the key factor in determining durability against rust and corrosion. Unlike more commonly used aluminium, stainless steel is non-porous and non-corrosive with a higher resistance to rust from harsh cleaning agents due to its iron alloy made up of iron, chromium, nickel, manganese and copper. However, not all stainless steel is the same.

The Society of Automotive Engineers (SAE) grades stainless steel by the relative composition of the alloy between chromium and nickel. Minimum stainless steel requires 10.5% chromium, which provides basic corrosion resistance via a passive layer of chromium oxide on the exterior.

Sanitary food standards recommend for harsh washdown environments a higher 18% chromium and 10% nickel, which is commonly known by the 316 SAE grade. 316 stainless steel is superior to the most common 304 stainless steel (18% chromium and 8% nickel) for most harsh washdown environments, due to the addition of molybdenum. Molybdenum has the ability to withstand corrosion from many acids including chloride, sulfuric, hydrochloric, hydrofluoric, and most organic compounds. 316 stainless steel is also known as marine grade stainless steel due to its increased resistance to chloride corrosion compared to 304 grade.

Often, the active ingredients in sanitizers used during washdown include these acids and therefore 316 stainless steel is the ideal solution. Purchasing stainless steel accessories such as brackets, stands and encoders is also a good practice to prevent rust or corrosion and potential contamination. Often these accessories are just as exposed to washdown chemicals as the equipment itself.

Comparison of stainless steel alloy composition



3. Practice proper washdown procedures

Like any material, stainless steel can wear with continued use, especially under conditions where the chromium oxide layer is altered from abrasive cleaners, chlorines or sanitizers. Therefore, it is important to take care of even the highest quality stainless steel coding equipment during washdown shifts.

A few easy steps can slow the wear of stainless steel equipment:

- Use the appropriate dilution of cleaners, especially in the post-cleaning rinse
- If possible, rinse all stainless steel equipment with low-pressure water after the sanitation process
- Wipe off the front surface of coders with water if any streaks are left by chemical residue
- If damaged, re-passivate stainless steel using nitric acid or other oxidizing agents to maintain a non-reactive oxide film on the equipment surface



Videojet 1860 CIJ printer

The Bottom Line

Sanitation is a priority in food-safe production environments and even the smallest amount of rust or corrosion on equipment can result in regulatory fines or downtime. Preventing rust and corrosion of machinery is difficult in harsh washdown plants, therefore, it is important to consider equipment material when purchasing new coding or line machines. In order to prevent rust or corrosion, make sure to review washdown chemicals used in your factory and evaluate equipment exposure to washdown procedures. Then, choose the stainless steel grade that provides the level of protection required.

Videojet IP65 and IP66 rated coders are designed for washdown environments and utilise superior 316 grade stainless steel. Contact Videojet to discuss your variable coding needs today.



Videojet IP DataFlex Plus TTO

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