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Castrol Industrial

TECHNICAL BULLETIN

Rust Preventive Application

Overview

Successful rust-free storage of precision finished ferrous parts depends on many factors, but a key element is to effectively apply a protective film, which this bulletin will address. However, the handling and condition of the part before the rust preventive is applied is also important.

To effectively apply a rust preventive fluid, the parts first must be:

- Clean, with surfaces free of rust, swarf, chips, cutting fluids, oils, dust and lint.
- Handled with hands protected by lint free and oil free gloves.

If the part will have the rust preventive applied immediately after alkaline washing, while the parts are wet with wash or rinse fluid, it is recommended to select a rust preventive fluid with dewatering capability. Typically these would be solvent based rust preventives but there are some light viscosity oil based rust preventives with this feature built into the formulation.

Please remember that effective dewatering requires:

- Some time for the dewatering process to be completed (usually less than 5 minutes in most conditions).
- Accommodation for the excess rust preventive and water to drain away from the parts being protected.
    - Parts with surface features that could hold a pocket of excess rp and water need to be rotated and reoriented to permit effective drainage.
    - Avoid using parts trays that could trap displaced water in contact with the parts
    - Forced air blow-off devices can help remove excess rust preventive and water, especially from parts with intricate features such as drilled holes, interior cavities and the like.

Though many solvent and oil based rust preventive fluids will have fingerprint neutralization chemistry, it is still best practice to have production staff wear appropriate gloves (such as Nitrile or rubber gloves & please avoid cloth gloves) for routine part handling.

Fingerprint neutralization chemistry is formulated into rust preventive fluids to protect against inadvertent contact, not to protect against routine and frequent handling by unprotected hands.

Protecting Post-production and Service Parts

Parts produced in excess of current assembly requirements, or parts produced for service stock will require application of medium to long term rust preventives. These parts need to be inspected for pre-existing rust or lack of cleanliness due to dust or grime from short term storage and handling.

- Rusty parts should be segregated for rust removal processing.
- Parts requiring cleaning should be cleaned in an appropriate fashion (usually alkaline or solvent cleaning).

Generally, parts are most effectively protected by dip application of a rust preventive. Spray application may also be effective for larger or irregularly shaped parts, but care must be taken to provide application to all of the part surfaces.

- Uni-directional spraying can only be effective if the parts are rotated and otherwise manipulated in the

spray pattern to ensure all surfaces receive adequate coverage.
- Surfaces shielded from direct spray will likely be inadequately protected, if at all.

If parts are to be dipped at some point shortly after being cleaned with alkaline cleaners (water based wash fluids), it is best practice to use a dip tank that has a “vee” or sloped bottom and equipped with a drain petcock to remove displaced water. This drained fluid can be inspected for water content and disposed of in a safe, compliant fashion with other aqueous contaminated process waste fluids.

Parts being handled individually by hand after washing or after rust preventive application should be done with hands protected with appropriate PPE to avoid part contact with potentially corrosive skin oils or sweat.

Storage Conditions

Storage conditions are an important factor in successful medium to long term part protection. High value precision parts are best stored in heated or climate controlled environments to avoid exposure to severe temperature or humidity changes over the term of storage. Climate control provides in an environment where the parts are not subjected to frequent exposure in conditions in which the part has cooled to a temperature below the dew point of the air around them. If a part cools below the dew point, condensation will accumulate on the part surface and attack any unprotected surface. So called “flash rust” often is evidence that a part cooled below the dew point and the resulting condensation caused rust.

If climate control is not available for medium to long term parts storage, then rust preventive fluid selection must be appropriate to the more challenging conditions. The rp fluid selected will need to provide a more robust barrier film to achieve effective protection.

Packaging

Good packaging practices are often part of a comprehensive storage plan for effective medium to long term storage of precision ferrous parts. Sturdy covered plastic bins or heavy treated fiber board boxes with lids will protect parts from handling bumps and dust. If they are sealed, they can take advantage of VCI (Vapor-phase Corrosion Inhibitor) treated desiccants, paper, and bags for part storage enhancement. VCI containing rust preventive oils can also be used on parts stored in sealed containers. The VCI component helps to provide a protective environment around the part.

The use of untreated fiber board boxes and separators can expose parts to paper processing chemistry that can cause corrosion on contact surfaces, especially if high humidity or moisture from wet parts is allowed to dampen the paper surfaces.

Product Use

<u>Dip tanks</u>
As mentioned above, dip tanks constructed with a “vee” or sloped bottom can help displaced water collect below the rust preventive fluid and if equipped with petcocks at the low point, allow drainage of accumulated water. In addition, if high volumes of accumulated water are anticipated, a false bottom or screen may be utilized to prevent lowering parts into the water collection zone at the tank bottom. Parts racks or baskets can be raised and lowered repeatedly, or shaken while immersed to help flush out water that may accumulate in part cavity features like drilled holes or pockets. Daily or weekly draining of collected water is advised to help prevent using contaminated rust preventive. Drainage frequency should be based on the volume of water being collected.

Dip tanks that may have intermittent usage should be equipped with a lid to be closed when not in use. This protects the rust preventive from air-born dust and contamination. If solvent based rust preventive fluids are in use, it will help prevent rapid evaporation of the solvent component. VCI containing products will benefit from a covered dip tank by preventing the VCI component from dispersal when the tank is not in use.

<u>Brush application</u>
Heavy filmed fluids may be applied by brush. Use caution to be sure all surfaces are covered as gaps in coverage will leave unprotected surfaces vulnerable to become rusted. Brushing is recommended only as a last option when large workpieces or machinery requires protection and effective spray equipment is not available and dipping is not practical.

Spray applications

Spray application of rust preventive fluids should be used in well ventilated areas if applied by hand spraying. Mist collection and backdrop panels should be considered to avoid excess spray from migrating beyond the work area. Mist collection systems should be appropriate for the flash point of any solvent or oil containing rust preventive fluids in use.

Drainage racks

Drainage rack stations should be equipped with collection trays or pans to help contain excess rust preventive fluid or displaced water that may accumulate. This will help avoid spillage and potential slip and fall hazards. The excess rust preventive should be disposed of appropriately.

The reuse/recycling of ~~sprayed dewatering type rust~~ corrosion preventives is not recommended. ~~as the demulsification component is volatile and will dissipate while being sprayed.~~ If reuse or recycling is attempted, ~~the water separation~~ some product features ~~will~~ may become ineffective as ~~the~~ components ~~becomes~~ may be selectively depleted from the product.

Please refer to the appropriate Castrol Product Data Sheets for product specific application & features information, and the Castrol Material Safety Data Sheet for product safety information.

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