Eskom	Technical Bulletin	Technology

Title: **CHEMICAL TREATMENT AND POWDER COATING OF 3CR12 METERING KIOSKS DURING MANUFACTURING**

Unique Identifier:	**240-98195962**
Alternative Reference Number:	**<n/a>**
Area of Applicability:	**Engineering**
Documentation Type:	**Technical Bulletin**
Revision:	**1**
Total Pages:	**6**
Next Review Date:	**n/a**
Disclosure Classification:	**Controlled Disclosure**

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Date: 2015-09-07	Date: 2015-10-19	Date: 30/10/2015

PCM Reference: **PTM&C**

SCOT Study Committee Number/Name:**Metering and Measurements**

Content

Revision history

Date	Rev	Compiler	Remarks
Nov 2015	1	HPD Groenewald	Original document

1. Scope

1.1 Purpose

The purpose of this technical bulletin is to provide specific requirements in the manufacturing of 3CR12 metering kiosks.

1.2 Applicability

This document is applicable to manufacturers of 3CR12 metering kiosks.

2. Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.1 Normative

[1] ISO 9001: Quality Management Systems.

[2] ASTM 967-01: Standard specification for the chemical passivation treatments for stainless steel parts.

[3] ASM 2700: Passivation of Corrosion Resistant Steels.

3. Definitions

3.1 General

Definition	Description
3CR12:	A ferritic stainless steel containing 12% chromium.
Passivation:	Chemical treatment that increases the thickness of the naturally occurring chromium rich oxide film present on all types of stainless-steel surfaces.
Pickling:	Chemical treatment capable of removing heat tint or oxide scale from stainless steel.
Stainless steels:	Steels with at least 10,5 % of chromium and maximum 1,2 % of carbon

4. Abbreviations

Abbreviation	Description
°C	Degrees Celsius
2D	Cold rolled, annealed and pickled 3CR12 steel grading
C6H8O7	Citric acid
HF	Hydrofluoric
HNO3	Nitric acid

Abbreviation	Description
MPA	Mega Pascal
Na2Cr2O7	Sodium dichromate
µm	micron

5. Requirements

5.1 3CR12 material

3CR12 sheet metal with a 2D surface finish shall be used for the manufacturing of the kiosks.

All sharp edges on the kiosks as a result of cutting and punching shall be rounded off before any chemical treatment of the kiosk is started. This may be done through filing, sanding, grinding or abrasive blasting. Suitable blast media for blasting can be stainless steel shot, copper slag, glass beads, platinum slag or washed silica sand.

Abrasive blasting may also be used in place of the chemical pickling process as described in 3.2.2. to remove all traces of discolouration and scale from the welded areas. Abrasive blasting over the whole surface of the kiosk may also produce a better finish for the bonding of the powder coating.

5.2 Chemical treatment

The corrosion resistance of 3CR12 is produced by an extremely thin Chromium Oxide film on the surface of the metal known as the Passive film.

Damage of this film occurs through the manufacturing process as a result of cutting, bending, welding and grinding.

The method to repair this damage after manufacturing and to restore 3CR12 to its original state is to passivate.

5.2.1 Degreasing

Kiosks and kiosk parts shall be degreased to get rid of any pick-up during the manufacturing process. Degreasing shall be done through a dipping method in a solution that contains strong degreasing agents.

5.2.1.1 Degrease exposure period

Degreasing shall be done for at least 10-15 minutes.

5.2.1.2 Cleaning

Thorough washing with copious quantities of clean cold water is required to remove any chemicals used. This shall be done through the use of a high pressure washer (200MPA or more) with an oscillating nozzle.

All areas of the kiosk shall be pressure cleaned.

5.2.2 Pickling

To prevent corrosion at the welded areas it is necessary to remove all traces of discolouration and scale from the welded areas. This shall be done chemically through a pickling process.

Chemical cleaning or pickling of 3CR12 steel shall be carried out using formulations based on Nitric (HNO_3) and Hydrofluoric (HF) acids designed specifically for 3CR12 steel.

Pickling formulations are aggressive towards 3CR12 steel and pickling shall be supervised to ensure that exposure periods are no longer than the minimum required to remove discolouration.

5.2.2.1 Pickling composition

Pickling formulations made up of 15-20 percent Nitric and 1-2 percent Hydrofluoric acids are considered suitable.

5.2.2.2 Pickling application

Application can be done to weld areas by brush, cloth, spray or dipping.

5.2.2.3 Pickling exposure period

Pickling shall be done for at least 20-30 minutes and a maximum of 32 minutes. Treated areas should not be allowed to dry out or be exposed to direct sunlight otherwise severe staining will occur.

5.2.2.4 Cleaning

Thorough washing with copious quantities of clean cold water is required to remove any chemicals used. This shall be done through the use of a high pressure washer (200MPA or more) with an oscillating nozzle.

All areas of the kiosk shall be pressure cleaned.

5.2.3 Passivation

Passivation shall be done to ensure that optimum corrosion resistance is achieved. Passivation shall be done according to method 1 (passivation in Nitric acid (HNO_3)) of standard ASM 2700 or method 2 (passivation in Citric Acid ($C_6H_8O_7$)) of standard ASTM 967.

5.2.3.1 Treatments in Nitric acid - Method 1

Three types of applications are selected for Nitric acid:

- Type 1 – Low temperature Nitric acid with sodium dichromate (Na2Cr2O7)
  - Composition: 20-25 volume percent Nitric acid and 2-3 weight percent sodium dichromate
  - Temperature: 21-32 °C
  - Application period: 30 minutes minimum, 35 minutes maximum
- Type 2 – Medium temperature Nitric acid with sodium dichromate
  - Composition: 20-25 volume percent Nitric acid and 2-3 weight percent sodium dichromate
  - Temperature: 49-54 °C
  - Application period: 20 minutes minimum, 24 minutes maximum
- Type 3 – High temperature Nitric acid with sodium dichromate
  - Composition: 20-25 volume percent Nitric acid and 2-3 weight percent sodium dichromate
  - Temperature: 63-68 °C
  - Application period: 10 minutes minimum, 12 minutes maximum

5.2.3.2 Treatments in Citric acid - Method 2

Three types of applications are selected for Citric acid:

- Type 1 – Low temperature Citric acid
  - Composition: 4-10 weight percent Citric acid
  - Temperature: 21-49 °C
  - Application period: 20 minutes minimum, 24 minutes maximum

- Type 2 – Medium temperature Citric acid
  - Composition: 4-10 weight percent Citric acid
  - Temperature: 49-60 °C
  - Application period: 10 minutes minimum, 12 minutes maximum
- Type 3 – High temperature Citric acid
  - Composition: 4-10 weight percent Citric acid
  - Temperature: 60-71 °C
  - Application period: 4 minutes minimum, 5 minutes maximum

5.2.3.3 Cleaning

Thorough washing with copious quantities of clean cold water is required to remove any chemicals used immediately after treatment. This shall be done through the use of a high pressure washer (200MPA or more) with an oscillating nozzle.

All areas of the kiosk shall be pressure cleaned.

5.2.4 Post-cleaning treatment

The passive film characteristic of stainless steel will form spontaneously in air, but this process is added to accelerate the formation of the passive film.

This dipping process shall be carried out using an aqueous solution of sodium dichromate within one hour after the last water cleaning process.

5.2.4.1 Process

- Composition: Aqueous solution made up of 4-6% weight percent of sodium dichromate
- Temperature: 60-71 °C
- Application period: 30 minutes minimum, 60 minutes maximum

5.2.4.2 Cleaning

Thorough washing with copious quantities of clean cold water is required to remove any chemicals used. This shall be done through the use of a high pressure washer (200MPA or more) with an oscillating nozzle.

All areas of the kiosk shall be pressure cleaned.

5.3 Powder coating

The kiosks shall be powder coated after the chemical treatment.

UV stabilized powders of a polyester or acrylic type shall be used suitable for outdoor applications.

The thickness of the powder coating shall be between 60µm and 80µm.