Test Report

Validation of the in-place cleanability of conductivity sensor ISC40G(S) sensor with CLAMPXT-ISC40

According to the EHEDG Guideline Doc 2 – not part of EHEDG certification as the design of the sensor does not fully comply to the EHEDG hygienic design criteria.

Author(s): Alan Friis / Maria Anja Hansen

Customer: Insatech A/S

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Alan Friis

Digitally signed by Alan Friis
Date: 2023.12.11 12:25:29 +01'00'

Authorized signature

Test conducted at: FORCE Technology
Park Allé 345
2605 Brøndby, Denmark
Tel. +45 43 25 00 00
Fax +45 43 25 00 10
infofo@forcetechnology.dk
www.forcetechnology.com

Summary

Insatech commissioned the EHEDG Authorized Testing Laboratory FORCE Technology Center for Hygienic Design to perform the EHEDG Cleanability Test Method (EHEDG Doc. 2) to test the cleanability of the food contact faces of the conductivity sensor ISC40G(S) sensor with CLAMPXT-ISC40. Testing is carried out according to standard procedures for accredited EHEDG testing.

The test results published in this report show that the product contact surfaces of the conductivity sensor ISC40G(S) sensor with CLAMPXT-ISC40 were easy to clean and the cleanability is better than of the reference pipe. The test was repeated three times for each gasket material (EPDM and FKM). The obtained results are comparable to each other, and remaining soil detected was randomly distributed.

Contents

1 Introduction

Insatech commissioned the EHEDG Authorized Testing Laboratory FORCE Technology Center for Hygienic Design to perform the EHEDG Cleanability Test Method (EHEDG Doc. 2) to test the clean-ability of the food contact faces of the INSA-ISC40G(S) EHEDG conductivity sensor.

2 Description of test object

Name of test objects	
Type	Condutivity sensor
Unique model code	ISC40G(S) sensor with CLAMPXT-ISC40
Diameter of the inlet and out-let ports	2” of flow cell
Material of construction	EN 1.4404 for the connector and temperature sensor Sensor in PEEK
Surface finish specification	Ra < 0,8 µm
Type of seal	EPDM, FFKM

A photo of the test item is shown in Figure 1 and the test setup in Figure 2.

Figure 1. The sensor in the process connection

Figure 2. Test setup

3 Time schedule

The conductivity sensor from Insatech arrived at FORCE Technology Center for Hygienic Design January 3th 2022. Testing was preformed from January 4th to May 18th 2022.

4 Material and method

Before testing the conductivity sensor mounted in a T-piece and a 2" reference pipe (inner surface roughness $R_a \approx 0.5$-0.7 µm) were thoroughly cleaned and sterilized by steam at 121 °C for 30 minutes.

The reference pipe and the test item were soiled under pressure (5 bar gauge) using a buttermilk solution containing 10^5 - 10^6 spores/ml of the test strain *Geobacillus stearothermophilus*. During soiling a pressure of 5 bars was applied 3 times and held for 2 minutes each time. The buttermilk was drained out of the system the whole system was dried by flushing with dry filtered air at a velocity of 1.0 m/s until the soil is dry in all parts and minimum 2 hours.

Following drying, auxiliary pipes were mounted in front of the reference pipe and after the sensor assembly. The system was cleaned-in-place in an in-place cleaning test rig by:

1. Rinsing with cold water for 1 minute;
2. Circulating a 0.33 % detergent solution at 63 °C (± 2 °C) for 10 minutes;
3. Rinsing with cold water for 1 minute

For stages 1, 2 and 3 the mean velocity of liquid flow in the reference pipe was 1.5 m/s. A back pressure of 1 bar was set during all stages of the CIP cleaning. A schematic of the test setup is shown in Figure 1.

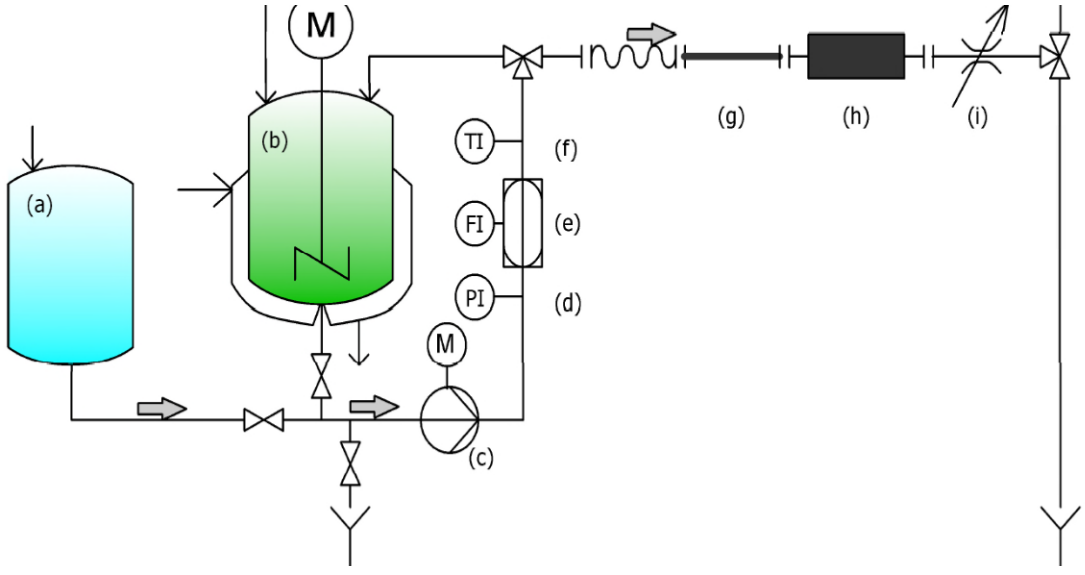


Figure 1. Test rig schematic diagram showing installation position for test object (h). Rinse water tank (a), Detergent tank (b), Pump (c), Pressure meter (d), Flow meter (e), Temperature sensor (f), Reference pipe (g) and back pressure gauge (i).

At the end of both rinsing procedures, a sample of the out flowing water were taken, and 5 ml aliquots were poured plated with MSH agar.

After cleaning the inner surfaces of the test item and reference pipe were covered with molten MSH agar. After the agar had fully solidified the test item and reference pipe were placed in an incubator at 58 °C for 16 - 24 hours.

After incubation the test item and reference pipe were examined for the presence of yellow discoloration in the agar. The degree of discoloration in the agar taken from the test object was compared to the degree of discoloration in the agar taken from the reference pipe.

5 Results

The in-place cleanability test was conducted 3 times for each gasket type.

The individual results of the tests are comparable with each other. The yellow discoloration in the MSH agar from the product contact areas of the sensors and the reference pipe are summarized in Table 1. The observed yellow discolorations were randomly distributed.

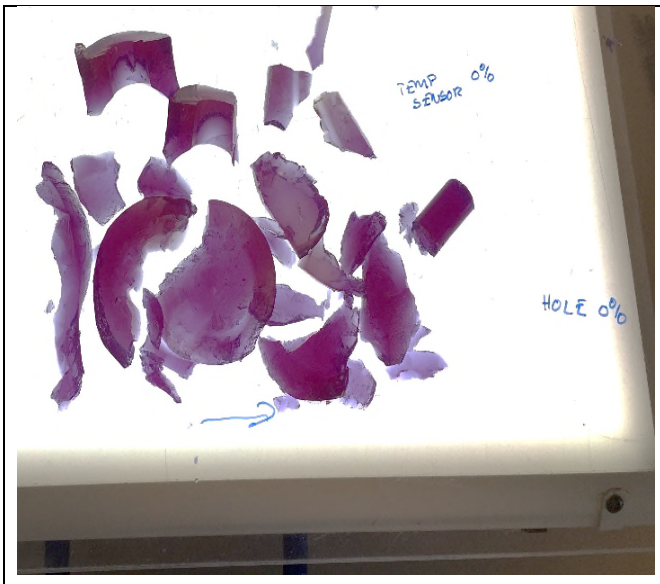
Table 1: Summary of test results for the conductivity sensor whit FFKM Gasket

Test object	**% discoloration of agar**		
	Test 1	*Test 2*	*Test 3*
Sensor rod and head	0%	0%	7%
Temperature sensor	5%	7%	0%
Reference pipe	19%	15 %	9%

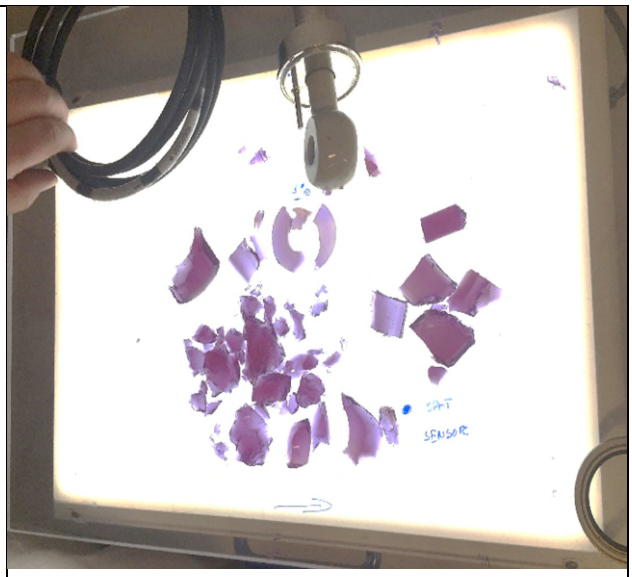
Table 2: Summary of test results for the conductivity sensor whit EPDM gasket

Test object	**% discoloration of agar**		
	Test 1	*Test 2*	*Test 3*
Sensor rod and head	0%	<5%	0%
Temperature sensor	0%	0%	5%
Reference pipe	9%	5%	15%

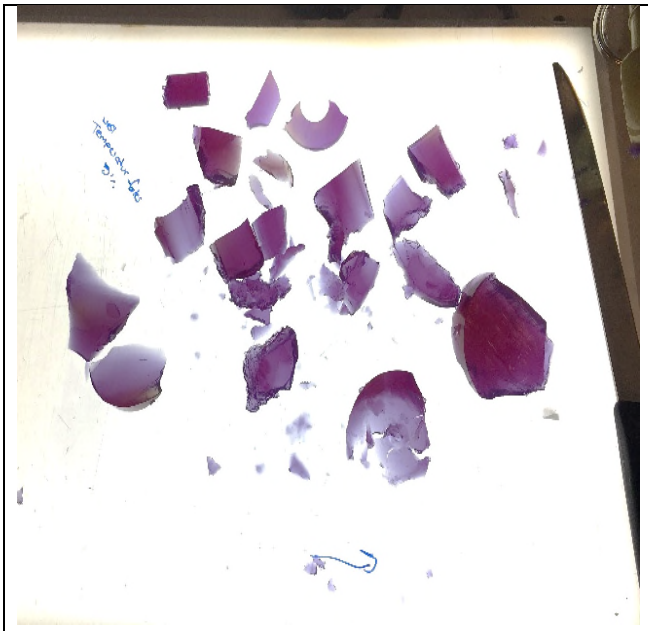
Pictures of selected tests



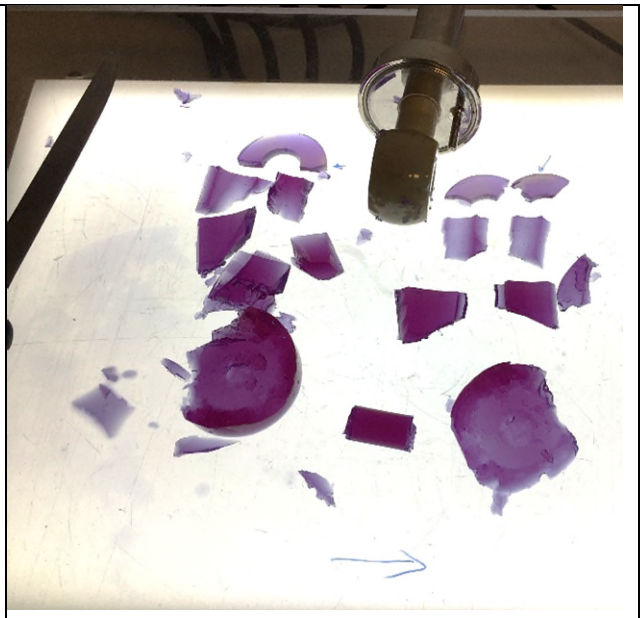
Test:1 EPDM Gasket



Test:2 EPDM Gasket



Test:2 FFKM Gasket



Test:3 FFKM Gasket

6 Conclusions

The test results demonstrate that the wetted surfaces of the tested conductivity sensor are cleanable in-place at least as well as the reference pipe.

The test results demonstrate that the wetted surfaces (product contact surfaces) of conductivity sensor ISC40G(S) with CLAMPXT-ISC40 is easy to clean and that the cleanability is better that that of the reference pipe. The results obtained in three tests are comparable to each other and remaining soil detected was randomly distributed. The conclusion is that the sensor is more cleanable than the reference pipe.

7 Records

Original data sheets, protocols and the final report will be in the archives of Force technology for 5 years after completion of the study.

8 References

EHEDG guideline: A method for the assessment of in-place cleanability of food processing equipment, European Hygienic Engineering and Design Group, Doc 2, Third Edition July 2004, updated June 2007.

Force Technology, Center for Hygienic Design test protocol accredited by DANAK: Method for in place cleanability according to EHEDG Guideline Doc 2 (ID 71.50.01.01).

9 Authentication

We, the undersigned, herewith declare that the tests reported here were carried out according to the agreed protocols, that this report contains an accurate description of the results and that the results relate only to the tested object.

Appendix 1. Drawing of the sensor