

Re: cleaning of HPL plates for RPC gas gap - info

Kyong Sei Lee <kyong.sei.lee@cern.ch>

Sat 6/8/2024 05:40

To: Ian Crotty <ian.crotty@cern.ch>; Francesco Fallavollita <f.scofallavollita@gmail.com>

Cc: paolo.vitulo@unipv.it <paolo.vitulo@unipv.it>

Dear Ian,

I already sent Francesco some details for cleaning of HPL using MEK done at Damia Company in Korea. We brush out the contamination on the HPL surfaces using roller brushes and MEK. Use of MEK seems to be OK in Korea. In addition, we clean the HPL surfaces again using ethyl-acetate and IPA twice before gluing to reach a perfect cleaning condition leaving really nothing on the HPL surfaces. I don't know the detail scientific background for this. But, it works quite well. We have to clearly get rid of moisture causing condensation of the oil surfaces when gluing gaps. An air blush is used to dry the HPL surface.

1. To get proper strength of bonding of PC material (actually we do not feel the strong necessary of scratching the HPL surface)
2. To get uniform and thick oil thickness all over the inner surfaces of gaps
Actually, we repeat oil dipping and draining consequently twice to get rid of thin oil regions. After the first oiling coating, the surface to be oiled is not melamine surface but oiled surface before doing the second oil dipping. The linseed oil temp is set to 28 degree while temperature of ambient and compressor air (H=35%) for polymerization is set to 30 degree.

This is all I can explain.

Cheers, Kyongsei

보낸 사람: Ian Crotty <ian.crotty@cern.ch>

보낸 날짜: 2024년 6월 8일 토요일 00:12

받는 사람: Francesco Fallavollita <f.scofallavollita@gmail.com>

참조: paolo.vitulo@unipv.it <paolo.vitulo@unipv.it>; Ian Crotty <ian.crotty@cern.ch>; Kyong Sei Lee <kyong.sei.lee@cern.ch>

제목: Re: cleaning of HPL plates for RPC gas gap - info

Dear Francesco

Apologies for a late reply.

You are quite right to pay, great, attention to the surface condition of the HPL.

When you wish to attach a liquid to a substrate it is the preparation of those two components that defines the finished product. If you have ever painted anything you may have noticed strange formations of the paint as it goes on and "dries", due to silicone contamination, humidity and general contamination etc. The bonding agent whether paint or glue/adhesive must be compatible. The most common example we see everyday is the painted car you drive. A highly developed science.

The HPL substrate has been "moulded" in a high temperature press and to release the finished sheet there must be a release agent. I understood from our, with Paolo, experience in PanPla that "heavy oil" was used. Due to the high temp. and pressure the oil can permeate between the grains of the metal, "glossy", finish plate. So this oil must be removed. An alcohol, even isopropyl, will not do that. It can spread the film around and help you remove the oil but not remove it all.

In the past we used the company GT near Rome for this job. Then a series of events arose that stopped this activity. The cleaning agent was MEK used in a machine that fed the sheets through the spray and brushing process. This was used with success for years but one day a roller failed and was replaced with a spare one that was "identical" to the other ones also made from PU ! The rollers were sticky to the (my) touch confirming a problem with the new roller. I recall being surprised as I seem to remember that they the MEK and PU are compatible. The test you mention was done. The lab at CERN misunderstood when they say that MEK is used to produce the HPL, it is used to clean it. This then had to stop.

Then an apparent concern with the risk to the workers of using MEK necessitated a new ventilation system that would cost too much and that crucial part of the production chain dropped out !

At present the cleaning process is done in Korea by a company that took over from Korea University that produced that gaps literally in house. Kyong Seo Lee, here in cc, has been the main actor since the beginning of the project with CMS, perhaps last century !

We have experienced numerous problems with bonding of spacers and recently, a few years ago, the strange formations of the oil film around the spacers. They are both related in all or part to the quality of the cleaned HPL.

If you are going to use linseed oil, or other product, to improve the surface finish then you must be sure it will polymerise. I had tests done on each batch for the "wijs' index" that will define if polymerisation will occur. See another analysis;
<https://project-cms-rpc-endcap.web.cern.ch/rpc/Production/Oil%20&%20Bakelite/Oil/Documentation/CERN/ReportCERN.pdf>

There I think I have exhausted my memory of these battles.

I would advise you to stay in very close contact with the company and not believe what they tell you. It is essential you go there and make every effort to establish a good relation with them. You must check everything for yourself since you and the company have different agendas. You require the best of what for them is a very small production and they need to get the product out in quantity through the front door asap at the minimum cost.

I hope Kyong Sei will be able to help you out with some details that I am not aware of .

I hope this helps but it should not put your mind at rest !

Best of luck

Ian

From: Francesco Fallavollita <f.scofallavollita@gmail.com>
Sent: Tuesday, May 21, 2024 18:07
To: Ian Crotty <ian.crotty@cern.ch>
Cc: paolo.vitulo@unipv.it <paolo.vitulo@unipv.it>
Subject: Re: cleaning of HPL plates for RPC gas gap - info

Dear Ian,
Could you kindly give me your feedback on the previous mail?

Thanks a lot for your time and help.

Have a nice evening.

Best,
Francesco

On Sat, 18 May 2024 at 14:22, Francesco Fallavollita <f.scofallavollita@gmail.com> wrote:

Dear Ian,

I am reaching out to kindly ask you to share your experience in the construction and certification of RPC gas gaps.

I am currently working as a local coordinator on the certification phase for two German companies selected for the mass production of RPC detectors in Munich for the ATLAS experiment.

In the current phase of technology transfer to industries and prototyping, we are addressing the challenge of gluing the polycarbonate parts (spacers and lateral profiles) onto the HPL plates.

We currently clean the surfaces of the HPL plates and polycarbonate components with isopropanol and have noticed difficulties with the glue adhering correctly, especially on the mirrored surface of the HPL plate. Consequently, the spacers are particularly weak and fragile. Most "bonding failures" occur at the Bakelite level, with some minor cases occurring at the polycarbonate level.

Therefore, I would kindly ask you what would be the best procedure for cleaning HPL plates and/or if you are aware of the current cleaning procedure at the Italian GTE company. Our HPL plates come directly from the Italian company Teknemica and have NOT undergone any cleaning process prior to their arrival in Munich.

Moreover, in recent days, I have exchanged information with Paolo Vitulo, who is cc'ed on this email and has shared his many years of experience in the field of RPC detector technology.

Paolo sent me an interesting report on the FTIR analysis performed by you on some HPL samples to identify potential contamination (Please refer to the attached document).

In this regard, it is not entirely clear to me whether the presence of the organic contaminant from the urethane family originates from the production of the HPL plates or if it is a residue resulting from the use of MEK in the cleaning phase.

I would greatly appreciate your feedback.

Have a nice weekend.

Best,
Francesco

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