









The Scottish Society for Contamination Control

October 2001•

Issue 43

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CLEANROOM TECHNOLOGY

by
BILL WHYTE

plus S2C2 Annual General Meeting

Thursday, November 15, 2001
Erskine Bridge Hotel, Erskine, Near Glasgow

This is a slightly expanded course of the one Bill Whyte has built up over the last ten years. Those attending will receive the 100 page course manual that goes with the course. It is also possible to purchase, at a discounted price, his new 320 page book which covers the same material as the course but in more detail.

The course will cover:

- ✓ Basic Design Principles
- ✓ Cleanroom Clothing
- ✓ Specification and Validation
- ✓ Cleanroom Practices

Programme:

9.00 - 10.00	Registration
10.00 - 12.00	Cleanroom Technology
12.00 - 2.00	Lunch and AGM
2.00 - 4.30	Cleanroom Technology

Cost:

Members: One delegate (inc. lunch & tea/coffee) = £205.63 (£175 + VAT)

Non-members: One delegate (inc. lunch & tea/coffee) = £223.25 (£190 + VAT)

Contact: S2C2 office. Details on the left.

CLEANROOM GARMENTS

S2C2 were pleased to have Nigel Slater of Contamination Control Apparel Ltd, Bolton, Lancashire, give a half day course on Cleanroom Garments at Erskine Bridge Hotel north of Glasgow on June 5, 2001.

Drawing upon his 14 years of manufacturing cleanroom garments he shared his experience and knowledge with members who work in cleanrooms, provide garments for the industry or are involved in the laundering of them.

There is the theory and there is the practical side. Nigel is very much a feet-on-the-ground person. Clothing must function as a barrier but be comfortable to wear: "a blend of rocket science and practicality". Excellent contamination control clothing is no use if it gives too many problems to the wearer.

We dealt with questions like:

What should be purchased? What are the most important factors? What are the different types and properties? How will they be after 30 washes?

First the theory...

In an ideal world, a specification is arrived at and a garment system selected which has taken account of 3 obvious basic facts:

- [1] it must create a barrier to particles and micro-organisms
- [2] be comfortable, not clammy
- [3] be affordable.

Hopefully other points have been taken into account in the planning stages such as:

[1] the design should reflect the fact that the clothing is for contamination control and not designed to do other jobs as well. It is hard to get clothing to do 2 mutually exculsive jobs.

[2] the number of changes per day, or more likely, per week

Planning as part of the critical path should be far enough ahead so that when the new cleanroom is ready for occupancy the garments are ready for the personnel.

Then the practice.....

There are so many factors to consider when specifying and selecting garments that striking the right balance can be difficult.

There are, however, some pitfalls that can be easily avoided by if you know where they are. Nigel went through the whole process in detail and pinpointed some key questions that we need to ask ourselves. The following list are some of them.



Nigel Slater

1. Where do I start?

First set the Quality Assurance standard. What does the garment have to do? What level of contamination control are you aiming for?

Then consider what you can afford. If you're comparing disposable with reusable garments work on the 'cost per use' which includes laundering as well as the base cost of reusable garments.

The three factors of Performance, Comfort and Cost are interdependent; the higher the performance required, the more difficult (and, thus, expensive) it is to have a high comfort level. Indicators of how comfortable a

fabric is are its weight (lighter is better) and its Moisture Vapour Transmission Rate (higher is better).

Your decision will be the result of balancing garment function and comfort against the initial garment investment and the ongoing cost of laundering.

2. How do I get people to wear the garments properly?

The design of garments can help to ensure that they are worn properly, so this is a question that needs addressing early on. Badly-designed or ill-fitting garments may be impossible to wear correctly; a badly-designed hood, for example, may ride down over the eyes so that the wearer cannot avoid pushing it up, almost certainly causing particle escape in the process.

3. What on-site problems are there?

It could be helpful for the garment supplier to visit and have a look at people moving around the cleanroom. Do they, for example, carry equipment, walk up steps or have to bend down?

4. Have the wearers been asked for their input?

You will avoid major mistakes by consulting them, but don't set up a committee as you'll never get agreement on the fine detail.

5. Are the garments going to last?

The laundering which cleanroom garments need can be pretty harsh, so make sure that you cover this point with your supplier.

Some fabrics and components break up when subjected to gamma irradiation, so don't forget to include this in your specification if it is a requirement.

CLEANROOM GARMENTS continued

6. *Are the trims on the garments as good as the fabric?*

Don't forget to check that trims, logos and labels as well as the fabric itself will remain non-particle shedding for the anticipated lifetime of the fabric.

7. *How do I choose a laundry?*

The most important consideration is to make sure you choose one which is a proper cleanroom laundry, not just a glorified industrial one.

8. *What would make the garments last longer?*

Some fabrics are more hardwearing than others and design features can prevent excessive wear in certain places; for example, on overboots reinforcing the join between the sole and upper with strong polyester tape significantly extends their useful life.

9. *What if I need some garments at short notice?*

If they are fairly standard you may find them ex-stock; otherwise consider using disposable garments until your order has been made.

10. *What do I do with worn cleanroom clothing?*

It may still be usable in a non-cleanroom environment. Are there any other departments who could use it?

ESSENTIAL REFERENCE MATERIAL

IES-RP-CC003

Institute of Environmental Science
Recommended Practice *Garment System Considerations for Cleanroom and Other Controlled Environments*

ADDRESS: Obtain from S2C2 office, James Watt Building, Glasgow University, Glasgow, G12 8QQ (telephone 0141 330 3699).

Nigel Slater

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Web: www.ccaltd.co.uk



Bob Spector, President of IEST, presenting Fellowship Award to Bill Whyte [R]

Bill Whyte, founder and Honorary Life Member of the Scottish Society for Contamination Control, has been awarded a Fellowship in the Institute of Environmental Sciences and Technology, USA. The citation on the plaque he received reads "For outstanding technical research and publication in the field of contamination control and for a lifetime of service to international technical organizations in the field of contamination control".

ISO/DIS 14464 - PART 5 CLEANROOM OPERATIONS

This Standard is out in draft form. Get a copy now. (See pages 5 and 6). You need to know about it.

Background:

In the past, countries had their own standards and practices but there were no internationally accepted ISO standards. In 1993 a committee was formed to write them. The name of this particular committee was ISO TC 209 (International Organisation for Standards, Technical Committee 209).

As the ISO is a worldwide federation of national standards bodies any member body can be on this committee. The active members on this one are from USA, EU and Japan.

The ISO Cleanroom Standards:

There are 2 sets of standards for "Cleanrooms and Associated Controlled Environments". One set is general and the other set is for biocontamination.¹ They are ISO 14644 and ISO 14698, respectively. ISO 14644 has 7 parts. (Some are finished; some are not.²)

After seven years of writing, Part 5 is now at the Draft International Standard (DIS) stage. That means it is now available for public comment.

If you run a cleanroom you should be aware of this particular standard: Part 5. It deals with cleanroom operations, i.e. clothing, training, personnel disciplines, equipment, materials and cleaning.

Forum:

One of the aims the Scottish Society for Contamination Control is to provide a forum for discussion of these documents when they are being passed around for comment. To this end a meeting was held September 4th in Glasgow. Members were able to hear about the progress of this standard and received a copy of the Draft Standard.

Present to lead the discussion, listen to criticism and compile a set of views for use in modifying the document were:

Roger Diener, Secretary of the ISO 14644-5 committee and therefore responsible for the writing of the document and Bill Whyte, University of Glasgow, the UK expert on this committee.

Roger Diener pointed out that when running a cleanroom there are a list of points that must be addressed.

ISO 14644-5 is organised in such a way that one section lists the rules or guidelines called "Normative Requirements" and a bigger descriptive section is placed in Annexes (Appendices) serving as "Informative Guidance" where the committee gives information for you, the user.

The writing is clear and concise and states what subjects it does and does not cover. Only subjects relating to operating a cleanroom are covered.

Points Raised at the Meeting:

- * This document has to work for everyone. It has to cover from the most stringent to the least stringent aspects in all types of cleanrooms.
- * They give the requirements and let people chose how best to fulfill them. Those in charge, understand their process and are left to filling in the specific details for compliance.
- * Write down what you do and stick to it , i.e. do what you say you will do.
- * How long before it is finished? About 1 1/2 years. It is necessary to respond to comments and allow final translation.

See opposite page for condensed description on contents of each section plus a matching selection of comments.



Roger Diener is a Contamination Control Engineer in the Defect Reduction Group at Analog Devices Inc. in Wilmington, Massachusetts, USA.

He is responsible for all contamination control issues related to the daily operations at his site such as cleanroom garments, cleaning activities and all operational cleanroom protocols including frequent cleanroom renovations. He is

a member of Analog TQM teams involved in addressing and correcting root causes responsible for yield losses.

He is also a senior member of IEST and a contributing member to several contamination control Recommended Practice (RP) working groups covering topics such as Cleanroom Garments (CC003), Housekeeping (CC018), Personnel (CC027), Minienvironments (CC028) and Packaging Materials (CC032).

He is Secretary to ISO T/C 209 Working Group 5 which is the one that is responsible for this particular standard.



Bill Whyte is a Research Fellow at Glasgow University. He has been involved with cleanrooms for over 30 years and has a BSc in microbiology and a DSc in mechanical engineering. He has published over 100 reports and papers on contamination control and cleanroom design. He has edited a book *Cleanroom Design*, published as a second edition in 1991, and in the last

few weeks a book *Cleanroom Technology - the Fundamentals of Design, Testing and Operation*.

He is a member of British and International standards committees writing the new International Cleanroom standards. He has extensive experience as an industrial consultant.

¹ "Cleanrooms and Associated Controlled Environments, Biocontamination Control". This is another complete set of standards. The Secretariat used to be France; it is now the UK and Bill Whyte sits on this committee as the UK expert.

WHAT THE DOCUMENT COVERS

COMMENTS

Operation Systems.

An organised accounting for how important aspects for running the cleanroom will be accomplished and monitored.

The following shall be in place or identified:

Procedures relating to operation, repair, maintenance and monitoring as well as safety; risk factors; training procedures, and lastly documentation.

- * This is what standardisation is about: when a person leaves the job the next person can step in more easily. Furthermore, when you have an ISO Audit done, everything will be in place.
- * List possible contaminants. Make plans to remedy possible sources that are harmful to the process. You don't want your cleanroom or products affected by things that you haven't thought about.
- * This standard doesn't deal with safety directly. Other bodies do this. Whatever your safety programme is, document it and make sure your cleanroom is covered here.

Cleanroom Clothing:

The following shall be in place or identified:

Select the proper fabrics and clothing requirements.

Procedures for cleaning and training; cleaning schedules and contamination checks.

- * The standard does not dictate what to choose but functions as a checklist of what you need to think about. How important is it to your process?
- * Don't rely on cleanroom clothing to be both a particle barrier or filter and personal protection equipment.
- * If possible, give the people choices that are acceptable for your cleanroom. They will have less to complain about if they are part of the selection process.

Personnel:

Basic behavioural control: Personal and other items not intended for cleanroom use shall not be allowed inside the cleanroom, unless approved.

The following shall be in place or identified: guidelines concerning jewelry etc; training about personal conduct and lastly safety training.

- * Uncontrolled personal items mean uncontrolled contamination sources. Identify what is and isn't allowed.
- * Determine whether cosmetics are a problem for your particular process then your documentation can reflect this.
- * General unacceptable behaviours are listed.

Stationary equipment:

This is all the big equipment that only goes in once to the cleanroom and essentially becomes part of the cleanroom.

The following shall be in place or identified:

Procedures relating to the entry of equipment, installation, maintenance, repairs, decontamination beforehand.

- * Think of a cleanroom as your largest piece of production equipment that must be maintained as critically as the equipment and process within. It has to have records.
- * Consider the concept of preventative maintenance vs. repair maintenance.
- * Consider failure probabilities. If a belt in a centrifuge needs changing at x hours of use when you know failure occurs at y hours, remember that contamination can occur before y hours is reached by particles being thrown off.

Materials and portable and mobile equipment:

This includes all raw materials, supplies, small tools and portable equipment that can easily be taken in and out of the cleanroom.

The following shall be in place or identified:

Level of cleanliness for entry and use; procedures for entering cleanroom, storage, shelflife considerations; contamination risks.

- * What characteristics are important when selecting materials?
- * Determine how to get tools and supplies in.
- * How are waste materials removed?
- * Are procedures in place for toolboxes? Document it.
- * Think about electronic equipment, e.g. internal cooling fans may provide a contamination risk.
- * Think about CLUTTER. Avoid Clean Clutter, e.g. are all those extra bags of gloves needed?

Cleanroom Cleaning:

The following shall be in place or identified:

Procedures for routine cleaning both before and during work-in-process; personnel responsible; training; schedules; contamination checks; dealing with accidents.

- * Effective materials and a program. Workers are going to do best what they are rated on e.g. clean-looking walls don't get scrubbed because nobody rates it. Make it part of a check list.
- * Decide how you are going to monitor cleaning. Make sure it is clear what process is required. When will cleaning take place?

² Three (ISO 14644-1, ISO 14644-2 and ISO 14644-4) have been issued and others will follow soon. See *The Cleanroom Monitor*, May 2001, page 10.

To obtain a copy of Draft ISO 14644-5 contact the S2C2 office at James Watt Building, Glasgow University, Glasgow, G12 8QQ (telephone 0141 330 3699).

CHAIRMAN'S REPORT

Hello everyone.

You may remember in the last issue of *The Cleanroom Monitor*, I mentioned that I had concerns about the general standard of validation work and testing carried out by companies working in cleanrooms in the National Health Service. Since this time I have received further information from colleagues of other instances where testing was found to be of an inferior standard.

Do those of you involved in this type of work not understand the vital nature of the testing and that we rely totally on you getting it right? In most cases we do not have the resources or equipment to test for ourselves and therefore must have absolute assurance of filter integrity, correct air change rate and particle concentration to ensure we are preparing pharmaceuticals in the correct environment. If we do not have this assurance we could put patients lives at risk !!

Obviously I understand that a few of the testing companies are working to a very high standard but the majority seem to be sending out engineers who either are not properly trained or who simply cannot be bothered. As I received only ONE letter (thank you for replying) in response to my previous article I can only assume that the latter is the case.

This is obviously extremely worrying for myself and my colleagues. Can S2C2 help? Of course we can. We run course sand seminars four times a year. We propose to run our Cleanroom Validation course again in May 2002. Please send your engineers along!

Training is a important part of any Quality System and S2C2 will be looking at ways of accrediting engineers so that people like myself and my colleagues will have confidence in the standard of work being carried out.

The Cleanroom industry is really needing to have a long look at itself with regard to commissioning, validation and ongoing testing and I suggest that there is no time like the present.

I would encourage all companies involved to reply to me so that at least I know you are paying attention.

With regard to more pleasant issues, we are continuing to develop our website and are offering all companies the opportunity to advertise in the Products and Services section. Susan Brannigan will be contacting you in the near with respect to this facility.

The Cleanroom Forum continues to attract a high number of members - keep the questions coming in.

Remember if you can answer any points raised please do so. Our next course is on Cleanroom Technology - as stated on the front cover of this edition of the Cleanroom Monitor. Early application is advised as numbers are limited.

The Annual General Meeting will also be held on this day.

Remember this is YOUR society - information exchange is what it is all about. No-one should be left struggling with problems as the facility is there for advise and help.

Lynn Morrison, Chairman

STANDARDS FOR SALE

The S2C2 office sells British Standards and offers a 10% discount on all BSI purchases. In stock are ISO 14644 Parts 1 and 2 and also Part 5 (which is a draft). See front page for contact details.

CLEANROOM BOOKS

There's a 10% discount on the following:

[1] *Cleanroom Design* by Bill Whyte

Our Price: £67.50 [Normal Price: £75]

[2] *Introduction to Contamination Control & Cleanroom Technology* by Matts Ramstorp

Our Price: £36 [Normal Price: £40]

[3] *Cleanroom Technology - Fundamentals of Design, Testing and Operation* by Bill Whyte

Our Price: £40 [Normal Price: £45]

BOOK REVIEW

The 2nd edition of Bill Whyte's book *Cleanroom Technology Fundamentals of Design, Testing and Operation* is now out. It will be reviewed in the next issue of *The Cleanroom Monitor*.

Full details:

Cleanroom Technology - Fundamentals of Design, Testing and Operation by W Whyte. Published by John Wiley & Sons Ltd, Chichester, England, 2001. Hardback. 309 pages. ISBN 0 471 86842 6

The 48th Annual Technical Meeting
of the Institute of Environmental
Sciences and Technology
ESTECH 2002

Anaheim, California

April 28-May 1, 2002

This meeting will be held in conjunction
with the

ICCCS 16th INTERNATIONAL
SYMPOSIUM ON CONTAMINATION
CONTROL

PROFILE - Hal Smith

Hal is a contamination control engineer who has been involved with electronics and aerospace cleanrooms in USA for more than twenty years. He lives in Oregon and is currently President and Newsletter Editor of the Northwest Chapter of the Institute of Environmental Sciences & Technology (IEST) in USA. He has a Bachelor's Degree in Chemistry. He started out as an applied chemist working with plywood glues, urethane foams, and other formulated compounds.

He entered the cleanroom business at Tektronix in Beaverton, a suburb outside Portland, Oregon where Hal lives. At one time Tektronix was the largest maker of oscilloscopes. They built their first cleanroom in 1964 primarily for Cathode Ray Tubes.

He worked there from 1977–88, the last nine years as Cleanroom Engineer. The cleanrooms were used in the production of gyroscopes. The rooms were all white and people wore smocks and caps in the Class 10,000 and 100,000 rooms; coveralls and booties in Class 100.

All the Class 100 rooms were horizontal flow, and in all classes, there were many clean benches, mainly horizontal flow. Because Beaverton was in a suburb with little outside pollution, Class 10,000 rooms were fed by air filtered through 2 95% filters in tandem; Class 100,000 by a single 95% filter. With increased traffic and more diesel trucks, their less critical areas would, if they were still in use, be served by HEPA filtered air. Tektronix stopped making CRT's about ten years ago.

In the IC part, Tek used some of the first cleanroom tunnels when it opened its new facility in 1985. The building, still manufacturing IC's under another brand name, has an extremely low vibration profile.

One of the more interesting antics of the IEST was, in the 1980's, a proposal to change the size description of particles from "microns" or "micrometers" to "Whits". The new name was to honour Willis Whitfield, the inventor of the HEPA filtered/laminar flow cleanrooms. The project died aborning when one member piped up, "If we use those terms, we'll be measuring cleanroom class in terms of half-Whits!"

From 1988–93 he worked with Boeing as a Contamination Control Engineer. In this aerospace sector of industry, cleanliness was measured by MIL-STD-1246. Going from microchips to assemblies the size of a Volkswagen Beetle required a new look at contamination. The cleanrooms were larger, some 20 metres high, and varying in cleanliness levels Classes 1,000,000, 300,000, and 200,000 (old aerospace levels which were poorly constructed and maintained) to Class 100 where very sensitive assemblies were cleaned and processed. Isolation areas in these barn-like structures were common.

A lot of his job was spent at Tek and Boeing dealing with aspects which related to old working practices, processes and also the problem of old facilities. Managers were insensitive to contamination levels and the need to improve



contamination control thus causing poor quality. The other problem was that the materials being processed were so large, hard to clean or to keep clean that extra work was required to achieve the necessary levels of cleanliness. In one instance, a certain product at Tek suffered 1000% failure, 50% of which was caused by one type of contamination. After working with the management and employees, within a month, the levels of failure due to the one problem were reduced to 13%.

One of the biggest problems Hal faced was the lack of adequate documentation. If a product or process was tried, often the only information was "We tried it once. It failed." Too much time was spent searching for more details.

In 1993, he started his own consulting business which was in operation until he retired in 2000. Currently he serves on several IEST committees - Gloves (WG005), Wipers (WG004), Garments (WG003), Documentation (WG020), Swabs (WG025), Packaging (WG032), MIL-STD-1246 (WG901), and Military Cleaning (WG902). He serves also on the ASTM E21 (Aerospace Contamination).

He is a member of the ESD Association and the American Chemical Society. He writes the Contamination Control Corner for the Northwest Chapter of the IEST.

In 1998, he was awarded the James T. Mildon Award for his contribution to Contamination Control.

Nowadays he does voluntary work at the chemistry lab at the Oregon Museum of Science and Industry in Portland and acts as a judge at their Science Fairs. He is also a volunteer on the NorthWest Medical Team and Oregon Trout. He and his wife Pat are keen on square dancing and regularly travel to venues around America and Canada.

If you are looking for practical help or advice, log on to the S2C2 Cleanroom Forum www.s2c2.co.uk where Hal is able to share the benefit of his years of experience on a large variety of aspects relating to contamination control.

A CONTAMINATION AUDIT by Dr Sheila Hamilton

With changing technologies and smaller features within electronic interconnections the influence that contamination has on yields has greatly increased. This in turn has led to many more processes being carried out in Cleanroom environments. However even within these environments defects attributable to contamination still occur in significant numbers. The Teknek Contamination Audit sets out to identify all the different types of contamination present in the Cleanroom together with the sources of the contamination. It also highlights remedial actions to reduce the amount of contamination and so improve yields. The process can also be applied to general production environments and often the audit covers every aspect of a production facility from Goods Inwards to Final Dispatch.

Cleanrooms are classified by the number and size of the particles in the air of the room and so traditionally this has been used as the way to identify how clean the area is. It has been thought that the airborne particles, ie those small enough to be picked up and redeposited by air currents, were the main risk to yields and that by simply monitoring them the integrity of the cleanliness of the Cleanroom could be assured. The effect of contamination present on surfaces within the Cleanroom is ignored. Our Audits, which monitor surface contamination, have shown considerable volumes of contamination are generated within the Cleanroom and that despite intensive control measures significant amounts of contamination are brought into the Cleanroom by people and on the parts and their associated storage and transportation.

Methodology

The Contamination Audit focuses on the contamination found on all surfaces within the Cleanroom such as workbenches, equipment cabinets, floors walls and even the parts themselves. Tote trays and cart wheels are also sampled. Teknek's proprietary DCR (dust collecting) Rollers are used to pick up samples from the surfaces and transfer the contamination to DCR Adhesive Pads. These pads contain a special adhesive surface designed to remove the contamination from the DCR roller and to capture it permanently on the adhesive. The adhesive paper with the contamination is then overlaminated to prevent further contamination. The samples are numbered and identified with the area from which the samples are taken. A layout of each area is sketched and notes made about the process carried out. Potential contamination generators are highlighted.

Analysis

The main method of analysis uses an Optical Microscope with a camera attachment. Each sample is viewed and all types of contamination present on the sample are noted. A photograph is taken and also any unusual or dominant contamination.

The percentage of samples within each area which contains each specific type of contamination is calculated.

Results

The analysis results in a substantial report outlining the contamination found in each area with recommendations for improvements. A key feature of the report is the Contamination Matrix which shows a complete map of contamination found throughout the facility. A Sample Contamination Matrix is shown on page 8.

How to read the Matrix

The **areas audited** are down the left side and the **contaminants grouped by type** are along the top. The numbers in the boxes indicate the risk level based on the percentage of samples with that contamination. The use of colour for the Risk Bands makes it easy to spot the key target areas for improvement.

The use of the this Matrix makes it easy to track the effectiveness of improvements as the Contamination Audit can be repeated after a period and the resulting Contamination Matrix overlaid on the original one to highlight changes in the pattern and level of contamination. The adjacent photographs are typical of the ones used in the report.

Sample 1 is taken from the top of equipment in a Cleanroom and shows large amounts of clothing fibres in spite of full gowning procedures.

Sample 2 is taken from inside a container used to transport PCB's (printed circuit boards) within a Cleanroom and shows a variety of contamination including metal fragments and beard hair.

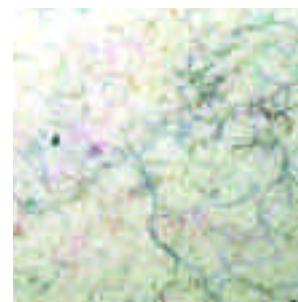
Sample 3 is taken from an Exposure unit and indicates a wear issue in part of the mechanism.

Conclusion

The Contamination Audit is invaluable in identifying the amount and sources of different types of contamination present within a production process whether or not the process is carried out in a Cleanroom. Implementation of remedial measures based on the Contamination Matrix reduces contamination and increases yields significantly.

What to do next

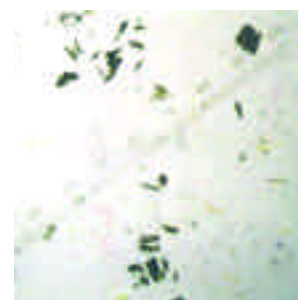
See page 10 & 11 for information and a template of the grid.



Sample 1



Sample 2



Sample 3

A CONTAMINATION AUDIT - ACTION

This audit was designed by Dr Sheila Hamilton of Teknek Electronics Ltd for one particular work process. By removing the descriptive information from the coloured worked example we have created a template from the original one. This is on the opposite page.

Photocopy it and start using it in your own place of work. If you have any questions please contact her.

Contact:

Dr Sheila Hamilton, Teknek Electronics Ltd, Inchinnan Business Park, Inchinnan, PA4 9RT, Scotland.

Tel +44 (0) 141 568 8100 Fax +44 (0) 141 568 8101

Email: info@teknek.com Web: www.teknek.com

MONITORING

Question 1 : In your practice, how often do you monitor the airborne particle cleanliness of cleanroom. [DE]

Answers:

[1] It depends on a lot of different factors. I strongly suggest you start by reading the new ISO standard (14644-2) that addresses this issue. [KG]

[2] We monitor our CR, 24 hours/day 7 days a week. We use a Lighthouse System for particle, Temp, RH, Diff-pressure, Ionizer and ESD. We always know how clean it is. [E]

Question 2: I'm using a handheld particle counter in monitoring the cleanliness of our cleanroom. Is there a standard how to use it? What should be the correct distance of isokinetic probe from the ceiling? [DR]

Answers:

[1] You will find lots of articles written on the subject but a good rule to follow is bench height or say 900mm. Remember, the general idea is to prove the cleanliness in the working plane. [CP]

[2] To monitor the non-viable airborne particulate in cleanroom, a discrete particle counter with a distant sampling probe would be more accurate. Particles would be generated from technician when he make any movement around the sample location. To have a better and accurate result, try to place the handheld particle counter on a clamp-stand and sample at work height. [CN]

Question 3: Is there an international standard available that is equivalent to BS5295 that defines methods and sampling points for clean room environmental monitoring? [JB]

Answer:

[1] ...there isn't a standard re monitoring and sample positions since this is subject to your own risk assessment study. The number of sample points etc are up to you for general monitoring. The cleanroom specs only refer to validation of the room. [CP]

Source: S2C2 website www.s2c2.co.uk. Click on Forum on the Home Page to read questions and answers or post your own. Note that there is also an archive section which is worth checking. Somebody may have already answered your question.

FOR SALE OR LEASE

I have a mobile clean room for sale or lease if anyone is interested contact me at johnb@atgweb.com

Thanks

John Barlo, Oregon, USA[Oct 5, 2001] www.atgweb.com

TYPE OF CONTAMINATION																																																																																																																																																																																																																																																																													


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Design and Installation

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