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How Much is Enough?

We often get this question. A person will phone and ask about how much penetrant (or remover or developer) will be required for a job that needs to be inspected. Often the person does not have any data about the part size, surface condition, or other helpful (necessary) information, since the job is not at hand but is a job that he is hoping to get if he is successful at bidding on it. Of course we try to help, but often it is not easy. In those cases, we recommend that the person wait until the actual parts are at hand, and then purchase a small amount of what will be required and make an on-the-job test. From the test, which not only incorporates the actual part, but also now brings into play the actions of the person making the test, one can then estimate the actual amount that is required

for the job. This is a do-it-yourself test.

But people want numbers so we try to give them some estimates as a guide. A rule of thumb is 1 penetrant aerosol to 3 developer aerosols. Cleaners, well that is any ones guess. We guesstimate an aerosol can of penetrant to cover about 300' of 1" weld or 25 square feet. But remember everyone sprays differently. For bulk use this relationship would work out to be about 300 square feet per gallon. Remember, the value of these numbers is worth what you paid to get them. Make your own tests for your application and technique.

Emulsifier Concentration

One might assume that all inspectors understand what the concentration of their hydrophilic emulsifier should be. For dip tanks, most specifications require that the concentration be maintained between 17% and 20%, and for spray application that the concentration be less than 5%. These are verified by using a refractometer and a chart that converts the refractometer reading into percentage. Surprisingly enough, we sometimes hear about widely divergent concentrations, sometimes at a point where we wonder if the reported concentration is either too high for a spray application or too low for a tank operation – like if a



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concentration of 7% was reported. Maintaining the proper concentration is necessary in order to insure good inspection. Too high a concentration can result in over removal and missing defect indications. Too low a concentration can result in excessive background, which can mask indications. Specifications require that the concentration be monitored according to the schedule in the specification, but it is prudent to have a refractometer handy so that if the inspection process seems to be acting a bit odd, it is simple and easy to use the refractometer to check the emulsifier concentration.



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The type of refractometer used for the concentration control is called a Brix refractometer which is commonly used to measure sugar content in aqueous solutions like wine, and fruit juice. Removers are not made of sugar water, or wine but often contain glycols which effect the refraction of light similar to sucrose and glucose. The scale used is 0-32 and the refractometer must be calibrated to the particular remover being used. A remover from one supplier will vary slightly from that of another supplier.

Met-L-Chek can supply batch specific charts for each of its **E-58D** batches upon request. This is a good starting point but unless the operator uses the same type of Brix refractometer Met-L-Chek used to create the chart the results can shift slightly right or left of the graph. To verify this a sample should be prepared using 4 parts water and one part remover (20% concentration), take the reading and compare to the chart. Water is zero so if your reading has varied from the graph draw a new line representing your refractometer reading of the batch.

If you do not have a chart for the remover you are using you will need to make one. We suggest making up a couple of concentrations of remover so you can plot your concentration control chart.

Some suggested points are:

- 3 water to 1 remover is 25%
- 4 water to 1 remover is 20%
- 9 water to 1 remover is 10%
- 1 water to 0 remover is 0%



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The Penetrant Professor

