

## Film processing

Applying correct positioning, projections, exposure dates, etc., as described in the previous chapters is not enough to achieve a good end result of the radiographic examination. Correct and professional film processing is equally important.

The instructions in this chapter are valid both for automatic and manual film processing.

### Automatic film processing

If an automatic film processing is used, it is important to follow the instructions that come with the machine. It should be noted, that even a small automatic film processor requires a separate, totally reliable electric supply for 3–4 kW, access to plenty of clean water, and well trained personnel for daily use and maintenance.

### Manual film processing

Manual processing requires more precision and attention from the darkroom technician than does automatic film processing, especially if the room temperature is high and the ventilation is poor.

A detailed description of the activities in and around the darkroom is given. It is anticipated that for the processing, a strict time/temperature control will be used, i.e. without visual control of the development.

For a detailed description of the management and maintenance of the darkroom (and examination room), the reader is referred to the WHO manual "Quality Assurance Work", Geneva 2001 (WHO/DIL/01.3).

## Procedures for manual film processing in a staffed darkroom

1. Bring the exposed cassette from the through-the-wall cassette hatch to the dry bench.
2. Unload the cassette.
3. Mark the film with the name of the examined person, date and name of the hospital. NOTE: film marking can be made outside the darkroom with a photographic marker if cassettes with a protected area at the back are used. This may shift the marking job from the darkroom attendant to the radiographer making the examinations, and will considerably improve the precision of the developing procedure.
4. Mount the film into a stainless steel frame of correct size.
5. Put the frame with film into the developing tank, and move it up and down twice, eliminating air bubbles on the film, ensuring that the whole film gets in contact with the developer.
6. Start the darkroom timer (which must be preset for the appropriate developing time for the actual temperature of the solution). Normal range is 5 → 3 minutes at 19 → 23 °C. With special precautions, the temperature range can be extended to 25 °C, using 2 minutes for the development. Shorter developing times than 2 minutes cannot be maintained properly in routine work.
7. Reload the cassette with a new film and return the cassette to the through-the-wall hatch.
8. After 1/2 minute in the developer, move the film frame up and down twice and make space for the next film frame to follow this one. Do not check the film blackening!
9. After the predetermined developing time (2–5 minutes depending on the temperature), transfer the film frame to the stop/intermediate wash bath (without checking the blackening!). Move it up and down two or three times during 1/2 minute, then transfer it to the fixing tank.
10. The fixing time is independent of the developing time, and is at least 3 minutes (for modern emulsions with low silver content), but preferably 5 minutes. Longer time will not damage the film. The film can be viewed in white light outside the darkroom after 3 minutes in the fixer, but should be returned to the fixer for another 3–4 minutes. Remember to put a lid on the developer tank before opening the darkroom door.
11. Transfer the film to the rinse tank, where it has to remain in running water for at least 30 minutes. Longer time will not damage the film. NOTE: the rinse water temperature should be close to the fixer temperature and not more than 27 °C.
12. Films are best dried (in their hangers) in a drying cabinet with forced ventilation, located outside the darkroom. If the air is heated, a thermostat must control the temperature so that it does not exceed 35 °C. If there is no drying cabinet, make sure that films hang where there is no dust and that the hangers are firmly fixed so they do not fall onto the ground. It is very difficult to remove dirt from a film, and scratches cannot be removed. If films in hangers are sent away from the darkroom, rinse them in the wash-tank for a few minutes when they are returned. Then dry them.