1.4.1. APPLICATION OF THE DIGITAL RADIOGRAPHY IN WELD INSPECTION OF GAS AND OIL PIPELINES

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The aim of this work is to evaluate the feasibility of the direct radiography on weld inspection in oil pipelines and gas pipeline during the manufacturing process. To that, 20 specimens with 6 different thickness and varied height of reinforced weld with 5 different kinds of defects were made. All samples were radiographied using Class I films and flat panel. For all specimens the inspection length was 8". Thus, with the flat panel the detector-to-object distance varied so that it may adequate to several diameters of the tubes.

The detector-to-object distance was calculated based on the physical size of the detector taking into consideration a safe distance between the tube curvature and the flat panel extremities, keeping the lowest possible magnification factor so that it could be obtained the length of the inspection. Images with 6 integration time for each experimental arrangement were obtained.

The images obtained with the Flat Panel/YXLON system were analyzed according to their quality by using the Contrast parameters (essential wire) (DNV 2007/ ISO 12096 – with reinforcement and ISO 10893-7 – basis material), Basic Spatial Resolution – BSR (ISO 10893-7) and normalized signal-to-noise ratio – SNR_N (ISO 10893-7) and by detectability using as reference the conventional radiography.

The results showed that for all thickness, the exposure time used to meet the image quality requirements were below with direct radiography. However the BSR were not reached for thickness of 4.85, 6.40 and 9.67 mm, therefore the compensation principle established by ISO 10893-7 was considered, that is, one more contrast wire for a less wire pair.

The digital technique proved to be more sensitive to real defects found on welds than the conventional technique. Then it can be conclude that the digital radiography utilizing the flat panel can be applicable to the oil and gas segment with advantages over conventional technique as to quality aspects, productivity, environment, safety and health.