

1.11.11. THE AUTOMATIC ACOUSTIC-EMISSION TESTING OF PIPES OVER THEIR HYDROTESTS

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With a view of increase of the warranty of pipes at release from manufacture or after their repair in conditions of repair shops it is expedient to accompany with hydraulic tests of pipes by the acoustic-emission control. High efficiency of process demands automation of processes of submission of a pipe on a site of hydrotests, its filling by water, installation of converters of acoustic emission (AE) on a pipe, raisings of pressure with simultaneous registration, processing of signals AE and distribution of results. Tasks of acoustic-emission control over the given conditions are solved with the help of the specialized system.

Developed system nuclear power plant NKT includes 7 AE-channels and provides data exchange with managing computer or the controller of a site of hydrotests according to standards 100BaseT. As a rule, 2 extreme converters AE are established outside of a body of a pipe and provide constant acoustic contact. Taking into account, that other AE converters are established on a body of a pipe automatically their acoustic contacts are not constant and depend on many factors. Process of the control is schematically carried out as follows. After receipt of a pipe on a site and its filling by water on system the corresponding signal then there is a process of calibration acts. A variation of acoustic contacts between converters and a body of a pipe are taken into account automatically by the electronic block on generated signals of acoustic emission by extreme converters. Also speed and attenuation of acoustic signals are specified, and presence of acoustic contact on channels is checked. Under certain conditions some channels can be excluded at registration. On the termination of calibration the system gives out a corresponding signal and, at reception of a signal about the beginning of a raising of pressure, passes in a mode of registration and processing of signals AE during earlier established period of time then gives out a signal about the termination of registration and corresponding results. At registration the system constantly accepts and fixes a signal about size of pressure in a pipe. Signals of acoustic emission from extreme converters can be used for interdiction of registration of foreign noise, and also in a location at registration.

At detection of a leak the program automatically passes in a mode of registration of a leak with distribution of the corresponding message to the screen of the monitor and a managing computer.

The system registers and gives out in real time on the display and on a computer of the top level the following messages:

- a) A leak in a zone of one of the ends of a pipe;
- b) A leak between converters on a body of a pipe;
- c) Active sources AE are not present;
- d) Dangerous source AE with the indication of coordinates of a source;
- e) The channel № is disabled.

In the program of system the following main opportunities on processing the received results (after measurements on one pipe) are incorporated:

- a) Calculation of a spectrum accepted AE signals;
- b) A filtration of signals;
- c) The graphic information on parameters of the accepted signals of acoustic emission;

d) The analysis of signals on PB 03-593-03 (Russian Federations) with the subsequent distribution of messages on a condition of a pipe.

System nuclear power plant NKT originally made for the control of tubings during carrying out of their hydrotests in conditions of repair shops within the framework of cooperation with CJSC “NTS-LEADER” (Khimki, the Moscow region, Russian Federation), provides the necessary automatic acoustic-emission control, and can be used for the control of wider assortment of pipes.