

1.12.25. EXPERIENCE OF WORKING OUT AND APPLICATION OF THE ULTRASONIC CONTROL OF WELDED CONNECTIONS FROM TWO-LAYER STEELS IN THE THICKNESS FROM 60 TO 250 mm

Pyshchev F.N., Okuneva R.G., OJSC “VNIPTchimnefteapparatury”,
Volgograd, Russia;
Bessmertnov E.V., OJSC “Volgogradneftemash”, Volgograd, Russia

In the report the information on working out and application of technology of the ultrasonic testing of vessels from two-layer steels with thickness of a wall to 250 mm contains.

OJSC “Volgogradneftemash” (earlier the factory of oil mechanical engineering of Petrov) over 40 years makes vessels and the devices working under pressure, including from two-layer steels in the thickness to 120 mm with the basic metal from steels 09G2S, 16GS, 12HM, 15H5M, etc. and a plating layer from steels 08H13, 08H18N10T, 07H25N12G2T, etc.

In connection with development of manufacturing techniques of reactors of the big capacity for hidrocraking the heavy oil rests application of the ultrasonic testing (UT) butt and angular welded connections with thickness of a wall to 220 – 250 mm from chromium-molibdenium-vanadium steels of type $2\frac{1}{4}$ Cr-1Mo- $\frac{1}{4}$ V, of two-layer sheets or with built-up weld, for example, from materials SA542 TpD Cl 4a + SA240 Tr347 was required.

Feature UT of the big thickness is necessity of the testing of layers of a seam after level-by-level (stage-by-stage) welding or a full seam from the basic metal from 2 parties of a wall of the case before drawing built-up weld.

By preparation for the testing the combined standard samples of the enterprise (SSE) with segment reflectors the area 7, 10, 20 mm² on vertical sides and on surfaces of a seam for corners of input of an ultrasonic beam 65, 50 and 40° have been made.

Technological cards UT of welded connections of reactors R-101, R-201, produced according to requirements OST 26-291–94 and ASME have preliminary been developed. After industrial approbation of technique UT on technological cards it is developed the instruction on the ultrasonic testing butt and angular welded of vessels and devices from two-layer steels with thickness of a wall from 60 to 250 mm, which extends on welded connections of vessels with external diameter not less than 1400 mm, with internal diameter of welded unions (hatches, branch pipes) not less than 200 mm.

In the instruction working parameters UT and schemes of the control seams, schemes of combined SSE for adjustment of sensitivity, the DAC-diagram are resulted.

According to the instruction the testing of a seam of the basic metal is spent, as a rule, from 2 parties of a wall of the case on 2–3 layers of a seam with application of inclined probes with corners of input 65, 50 and 40°, and also direct or TR the probe (in accessible places).

After drawing built-up weld the testing built-up weld a layer and a transitive zone by the probe with a corner of input 50 or 40° (depending on a thickness) is carried out.

Norms according to quality of welded connections are accepted on STO 00220256-005–2005 (OST 26-2044–83) and on ASME as durability of the case of the shell is provided with the basic metal.

Developed technique UT is coordinated with the Nizhne-Volga management of Rostehnadzor and applied at manufacturing of reactors with thickness of a wall of 180 mm from a steel of type SA387 Gr22 Cl 2 with built-up weld SA240 Tp347 (analogues in Russia 10H2M1 + 08H18N12B) for Mozyrsky oil refinery (Byelorussia).