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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 24675.1-2024

Replacing GB/T 24675.1-2009

Conservation tillage equipment - Part 1: Shallow cultivator

保护性耕作机械 第1部分:浅松机

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3 Terms and definitions

3.1 shallow scarification: soil loosening carried out no deeper than the plough pan, in which

the soil layers stay largely undisturbed. 3.2 shallow cultivator: an implement whose loosening depth does not exceed the plough pan. 3.3 plough pan: the compacted soil layer below the tilled layer.

3.4 shallow loosening depth: the vertical distance from the bottom of the loosened furrow to the ground surface at that point before the operation, expressed in centimetres.

3.5 remote monitoring system for shallow scarification: a system that monitors the work of the shallow cultivator automatically and processes the monitored data in real time. 3.6 operation area: the product of the distance travelled by the unit while at work and its working width.

4 Product designation

The type designation is written according to JB/T 8574. It opens with the classification code 1 for tillage and land preparation machinery, followed by the category code QS for shallow scarification, then the first feature code, X for the mounted form and nothing for the trailed form, then the second feature code, the number of folding sections written 1, 2, 3 and so on; after the dash come the main parameter, the working width in centimetres, and the improvement code, written A, B, C and so on.

The worked example given in the clause is 1QSX3-900B, read as a mounted shallow cultivator of the second improvement, with three folding sections and a working width of 900 cm.

5 Technical requirements

5.1.1 to 5.1.3 Guarding follows GB 10395.1 and the safe distances that keep the upper and lower limbs out of the danger zones follow Clause 4 of GB/T 23821-2022. Where a working part stands higher than 4 m in any operating or transport position, or when folded or opened, a safety sign and a warning about entanglement with overhead power lines are provided at a conspicuous place on the machine, and the manual warns of the danger of contact with such lines. Where rotating or folding parts are power driven, a stable control device is provided outside the rotating or folding zone. A locking device holds folded or rotated parts in the transport state, using a mechanical device, a hydraulic device or gravity self locking; where the hydraulic lock is not mounted directly on the cylinder, the hoses and pipes between cylinder and valve have a burst pressure of at least four times the rated working pressure of the system. The mechanical lock withstands the force produced by the folding or rotating control, and unlocking and opening are governed by separate operations.

5.1.4 to 5.1.6 Every machine carries safety signs conforming to GB 10396: a sign warning of crushing and shearing, for instance near the hitch lifting system and when the machine is raised or lowered; on wide folding machines, a sign near the folding device warning of crushing and shearing and calling for the locking device to be engaged when the machine

is folded; and a sign forbidding anyone to stand within the folding radius. Machines wider than 2.1 m carry rear marking reflectors or contour strips of reflective material. The manual gives the safety precautions for operation and maintenance and is written according to GB/T 9480.

5.2.1 On level test ground with soil moisture of 15 percent to 25 percent, soil firmness not above 2.0 MPa and stubble no higher than 20 cm, and at a depth not exceeding the plough pan, Table 1 requires a clod-breaking rate of at least 85 percent for clods no larger than 4 cm, a loosening depth set by local agronomic practice, depth stability of at least 80 percent, a weed-cutting rate of at least 90 percent, a surface levelness of 3.0 cm or better, a soil looseness of at least 15 percent, a wheel slip of the unit no greater than 15 percent and an operational reliability, expressed as availability, of at least 95 percent.

5.2.2 Table 2 sets the indicators of the remote monitoring system: depth measurement error no greater than 1 cm, area measurement error no greater than 3 percent, position data sampling interval no longer than 2 s, working speed measurement error no greater than 1 percent, and interval between data uploads by the terminal no longer than 10 s.

5.3 The machine is built to drawings and technical documents approved under the prescribed procedure; all parts are inspected, and bought-in and subcontracted parts carry inspection certificates before assembly; machined and pressed parts are smooth and flat, free of burrs and flash, and free of cracks and marked wrinkles; castings and forgings are free of blowholes, inclusions, shrinkage porosity and sand holes; welded assemblies are sound, with flat, clean welds free of missed welds, oxidation and burn marks; and the main dimensions and connection points of the hitch follow GB/T 20088. A remote monitoring system is recommended on the unit; where fitted it locates the machine accurately, measures working parameters such as depth, working speed, working time, cumulative area and real time position, takes photographs and transmits the data to a server in real time, and stores the monitored data for later query when the network connection fails.

5.4 The share is made of steel of mechanical properties not below the 35MnB of 6.4 of GB/T 3077-2015 and the shank of steel not below the 45 steel of GB/T 699; the share is heat treated to 40 HRC to 45 HRC and the shank quenched and tempered to 26 HRC to 30 HRC. The vertical or transverse teeth of the clod-breaking press roller are evenly distributed and of the height called for by the design. The hydraulic system and its components follow GB/T 3766, the controls being light, flexible and reliable and free of sticking; hydraulic components and fittings are arranged or protected so that a burst does not spray fluid straight at the operating position; the marked maximum working pressure of the hoses is not below the normal working pressure of the system; and the pipework is secured so that it cannot be twisted, flattened or damaged.

5.5 After assembly the vertical difference between the share points and the underside of the beam is not more than 8 mm. Bolts and screws in the main beam, the bearing seats and the hitch are of property class not below 8.8 of Clause 7 of GB/T 3098.1-2010 and nuts

not below class 8 of Clause 7 of GB/T 3098.2-2015, with reliable locking; Table 3 gives the tightening torque in newton metres for each nominal thread size, from a minimum and a maximum of 22 and 29 at 8 mm, 44 and 58 at 10 mm, 76 and 102 at 12 mm, 121 and 162 at 14 mm, 189 and 252 at 16 mm, 260 and 347 at 18 mm, to 369 and 492 at 20 mm. The depth and other adjusting mechanisms work easily, flexibly and reliably, rotating parts turn freely without sticking or knocking, and the lubrication points are filled.

5.5.5 and 5.5.6 On wide folding machines the folding mechanism folds and unfolds smoothly and without sticking, the two sides move in step where they fold and unfold together, and the hydraulic system neither seeps nor leaks; the folded sections are straight and neat when opened and have a locking mechanism; and in the transport state the folding parts are locked or fixed so that they cannot open of themselves in transit. The transport clearance is at least 110 mm for trailed machines and at least 300 mm for mounted machines.

5.6 Rust, oil, weld spatter and dirt are cleaned off before painting. Soil-engaging parts such as the shares may be left without primer and given black top coat only. The painted frame is even in colour, flat and smooth and shows no bare patches, and the machine as a whole is clean and free of rust and knocks. Painting follows JB/T 5673, with the ordinary weather resistant coating TQ-2-2-DM.

6 Test methods

6.1 The test ground is level and carries no more than 1 kg of vegetation, stubble included, per square metre, with stubble no higher than 20 cm, soil moisture of 15 percent to 25 percent and soil firmness not above 2.0 MPa. The measured section is at least 50 m long with run-in and run-out sections of at least 10 m at each end, and its width is at least ten times the working width. Absolute soil moisture, soil firmness and the state of the vegetation are measured according to GB/T 5262. The test machine and its tractor are in good technical condition and are adjusted and serviced as the manual requires, the tractor is not changed at will during the test, the operators are trained and certified, and the working speed of the unit follows the manual. The instruments and equipment used are calibrated and within their period of validity.

6.2.1.1 Depth is measured at the maximum, the minimum and the rated working speed given in the manual, working at full width; each forward speed is one test condition, each condition is run out and back, and three conditions are tested. Five points are taken on the diagonal of the measured section, the number of shares measured depending on the actual work, using a depth gauge or another instrument. On flat land the depth is the vertical distance from the furrow bottom to the surface before the operation; on ridged land it is the difference between the distance from the furrow bottom to a horizontal datum after the operation and the distance from the surface before the operation to that same datum. The mean depth, the standard deviation, the coefficient of variation and the stability coefficient