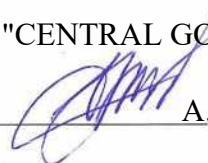


APPROVED BY:

Technology and Quality Director

PJSC "CENTRAL GOK"


A.B. Rtyshchev

TECHNICAL INQUIRY SPECIFICATION

Set of ceramic filtering elements BFP-3.10.

for KFD-90 ceramic vacuum disc filter

for the dewatering of concentrate

The set of ceramic filtering elements BFP-3.10. for the KFD-90 ceramic vacuum disc filter for the dewatering of concentrate is composed of:

- Ceramic filtering elements BFP-3.10 - 180 pieces;
- Scraper for removing the cake from ceramic filtering elements BFP-3.10. for the KFD-90 ceramic vacuum disc filter - 30 pieces;
- Bolt M14x85 A2-70 DIN 931 stainless for the fastening of ceramic filtering elements BFP-3.10 - 360 pieces;
- Nut M14 A4-70 DIN 934 stainless for the fastening of ceramic filtering elements BFP-3.10 - 360 pieces;
- Lock washer M14 A2-70 DIN 127 stainless for the fastening of ceramic filtering elements BFP-3.10 - 360 pieces;
- Heavy-duty stainless clamp 25x27 (W4; or W5) for connecting ceramic filtering elements BFP-3.10. to the vacuum manifold and the regeneration system - 720 pieces.

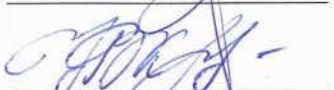
The main technical data and drawings are given in the Annexes (A - B).

PJSC "CENTRAL GOK":

Head of the Technology Office


D.F. Urda

Chief Ore Beneficiation Engineer


O.M. Gurenko

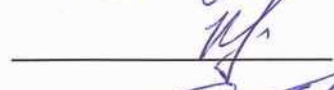
Ore beneficiation plant manager


O.P. Sidletskyi

Deputy ore beneficiation plant manager for engineering


S.Yu. Bezvershenko

Deputy ore beneficiation plant manager for technology and quality


O.M. Klimovych


S.P. Shyshov

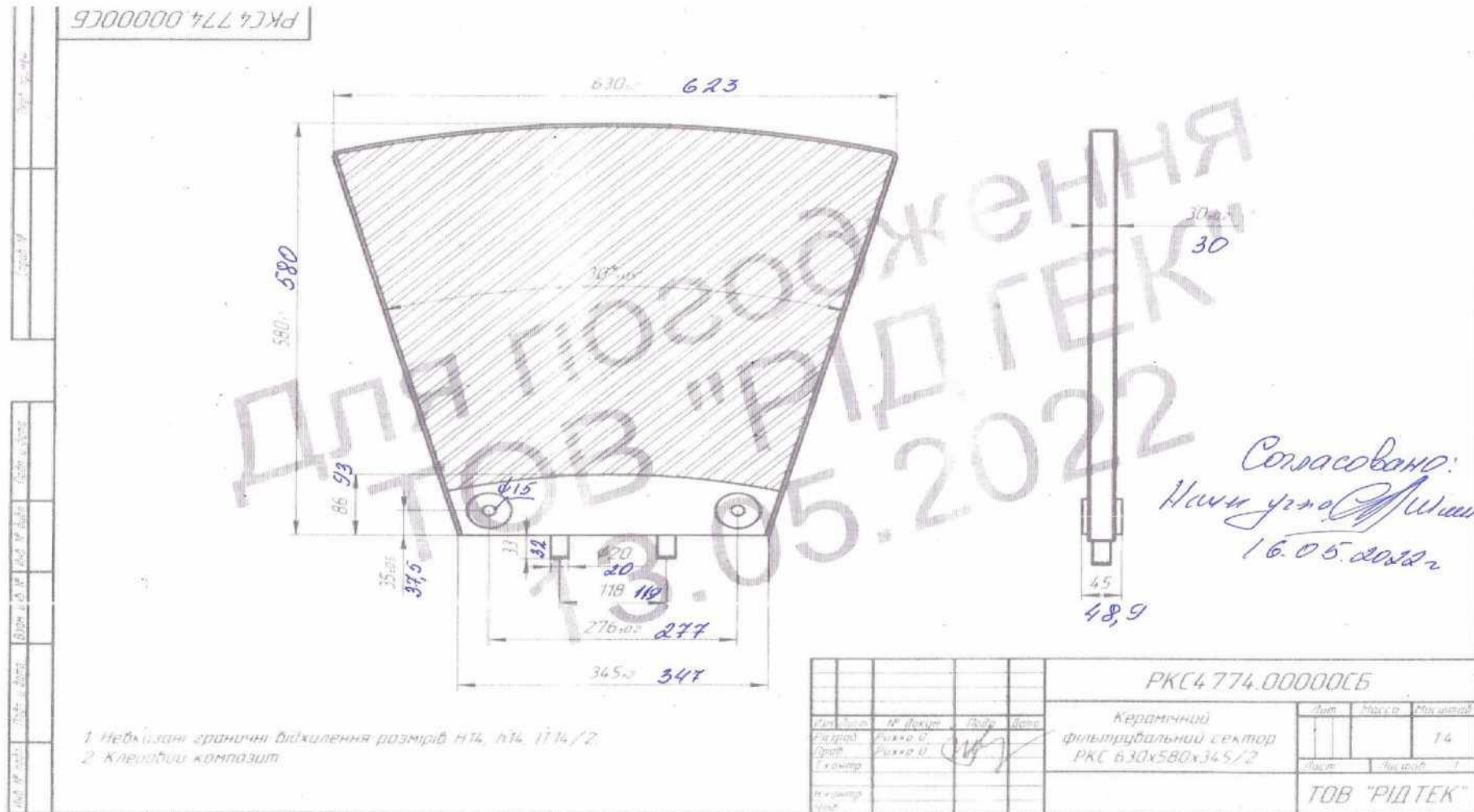
Annex A.1

Main Technical Data of Ceramic Filtering Element BFP-3.10.

Working medium	Iron ore concentrate slurry
Characteristic of the working medium	non-hazardous, non-explosive, non-fire hazardous
Minimal temperature of the medium, °C	2
Maximum temperature of the medium, °C	50
Open porosity, %	39-45
Pore diameter, μm	1-10
Compressive strength, minimum, MPa	90.0
Structural bending strength at room temperature, minimum, MPa	30.0
Relative strength of the membrane coating (grams of load with a diamond indenter)	at least 280
Acid resistance, minimum, %	97.5
Alkali resistance, minimum, %	88.0
H - overall height, mm	580 ± 2
t - thickness, mm	30 ± 1
D - overall width, mm	630 ± 2
S - filtration area (Σ 2 sides, m^2)	0.5
Nozzle material	stainless steel
Al_2O_3 content (without the nozzle)	at least 90%

Annex A.2

Drawing of Ceramic Filtering Element BFP-3.10.



Annex A.3.

List of Main Process Guarantees from the Supplier of the Set of Ceramic Elements:

Item No.	Process requirements and guarantees	Indicator
1	Guaranteed service life: ceramic filtering elements; scraper for removing the cake from ceramic elements.	at least 12 months from the date of putting into operating
2	Average shift throughput (t/h) of the vacuum filter (filtering surface area: 90 m ² , 15 discs, each with 12 sectors) is the design throughput of the sectors during the "working cycle"— from the start-up after regeneration every shift to the shutdown for the next shift regeneration — at a mass fraction of moisture not exceeding 9.4%.	at least 60 t/h during the period of operation for at least 12 months
3.	Mass fraction of moisture in the vacuum filter cake, %	max 9.4%; average 8.7-9.2%.

Main operating conditions:

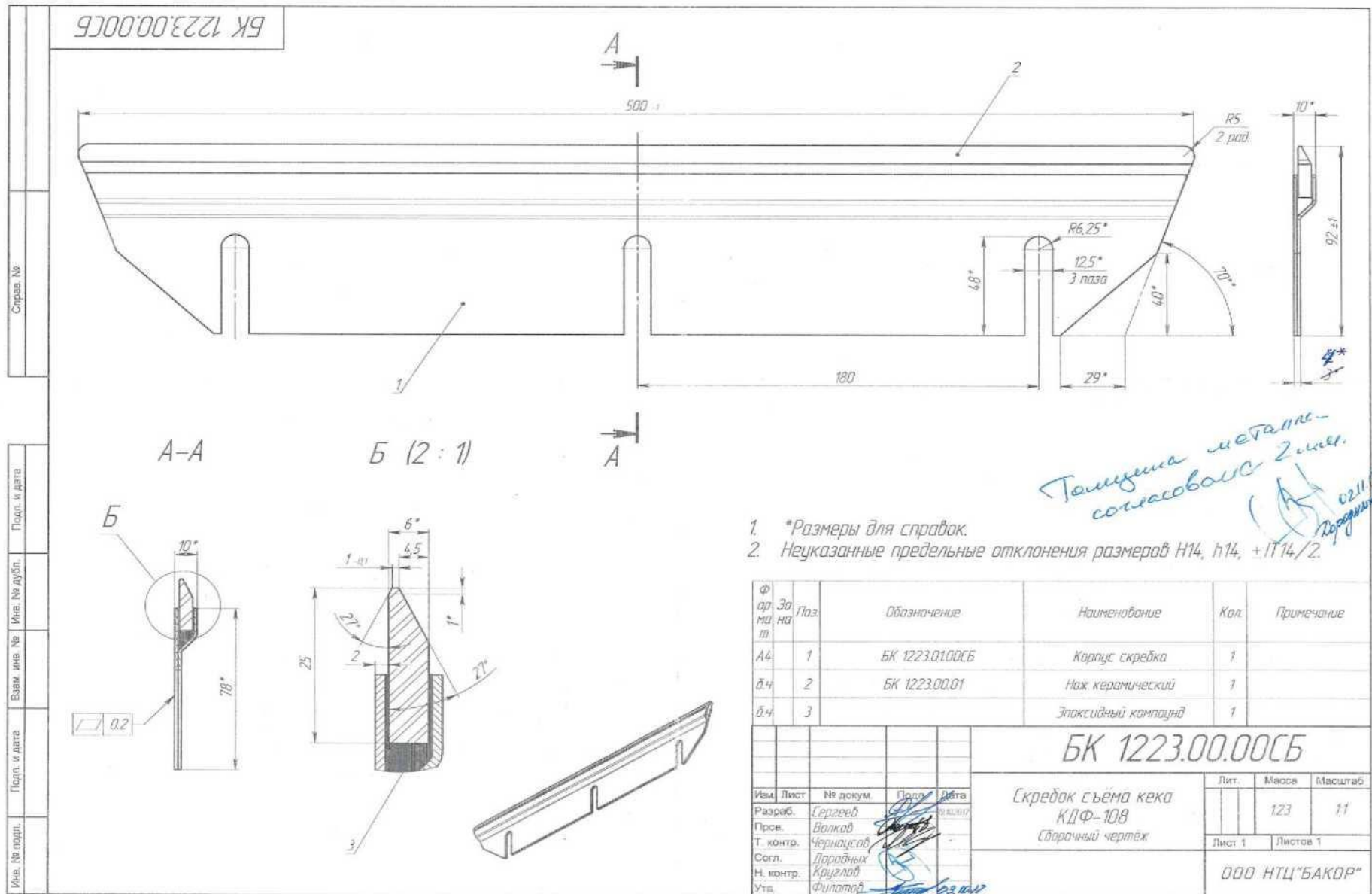
- Mass fraction of total iron in the concentrate..... 69.5-71.0%.
- Specific surface area of the concentrate..... 2,000 - 2,300 cm²/g
- Frequency of the combined chemical and ultrasonic cleaning (regeneration every shift): no more than once per shift (12 hours), with a duration of one hour; frequency of deep chemical cleaning (regeneration): once per month with a mixture of oxalic acid (50kg) and ammonium thiocyanate (50kg).
- Gap between ceramic element and cake scraper — 0.5-1.0mm
- Vacuum in the filtration zone (-0.15) — (-0.95) kgf/cm², drying zone (-0.45) — (-0.95) kgf/cm²
- No surfactants are used to reduce the mass fraction of moisture in the process.
- Water pressure during the backwash of the filter cycle....0.6-1.0 bar.
- Air cleaning of the sectors during each working cycle of the filter is not performed and is not provided for by the vacuum filter design.

The criteria for assessing the performance of the sectors are:

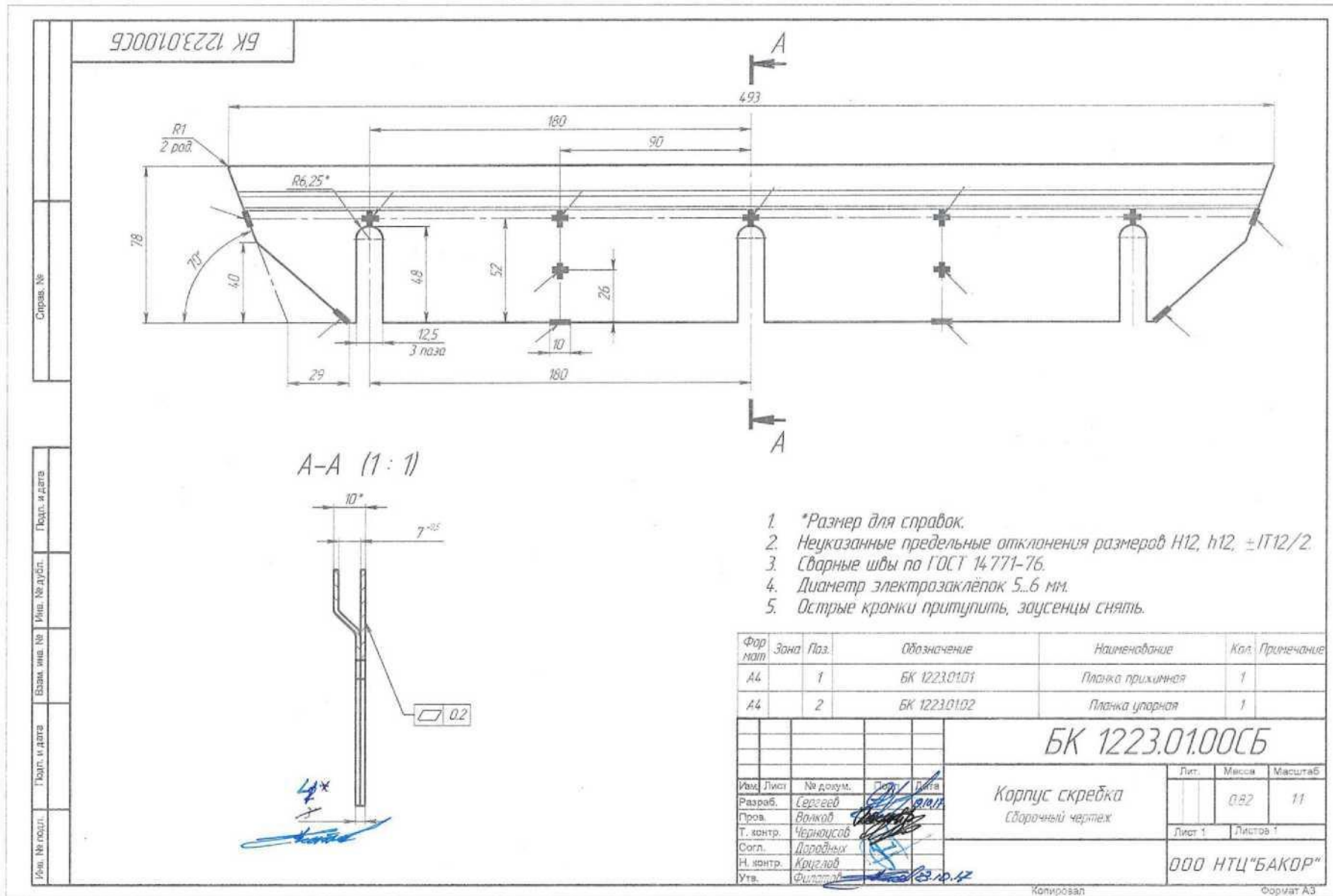
- service life of the sectors (during which the average shift productivity is maintained);
- conformity of the geometric shape of the sectors - the surface camber of the sectors with a gap to the horizon of less than 1.0 mm (a gap of more than 1 mm - the sector is rejected and must be replaced);
- technical condition and number of visible defects of the filter surface of the sectors (cracks, spalling, areas where the cake is absent during formation and drying, etc.);
- residual moisture in the cake;
- average shift throughput of the vacuum filter of at least 60 t/h during the period of operation for at least twelve months;
- design throughput of the sectors at a mass fraction of moisture in the concentrate not exceeding 9.4%, t/h;
- design throughput of the sectors during the working cycle – from the start-up after regeneration to the shutdown for regeneration.

Annex B

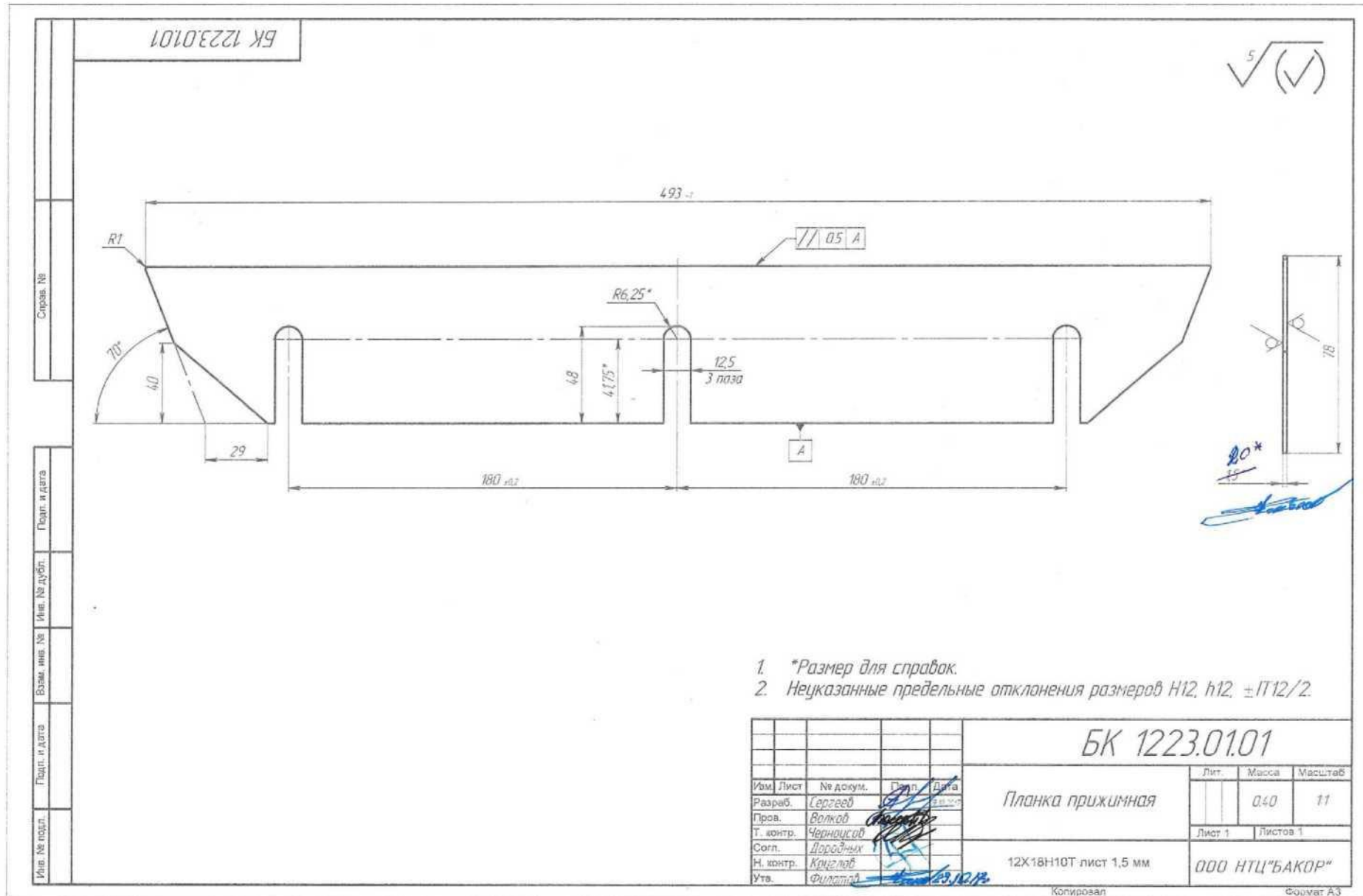
Drawing of the scraper for removing the cake from ceramic filtering elements BFP-3.10.



Continuation of Annex B



Continuation of Annex B



Continuation of Annex B

