METROLOGY SERVICE

Director
Metrology service Ltd.

Bozhko Nataliia
December 4th 2017

PROFICIENCY TESTING PT.UA.1.1.2016

WHEAT ANALYSIS (QUALITY)

PROFICIENCY TESTING REPORT

ROUND 2 NOVEMBER 2017(ENG)

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2. SUMMARY

2.1. The purpose of proficiency testing in wheat testing is to determine the characteristics of the operation (as described in ISO\IEC 17043[1]) and improve the reliability of test results.

2.2. This proficiency testing involves the use of inter-laboratory comparisons to confirm the performance of individual laboratories' abilities and/or identify areas of improvement.

2.3. This is the final report on the PT.UA.1.1.2016 Round 2 held in November 2017. This report is issued according to ISO\IEC 17043 [1] and PT.UA.1.1.2016 Round 2 Programme. The report is issued in two languages – Ukrainian and English. English should be considered as the basic language of the report. Both versions of this report can be found at: http://www.metrologyservice.com.ua

2.4. A total of 22 participants have reported. Their results are presented in the next clauses.

2.5. Technical experts list and/or subcontractors for this round can be provided to the Participant by request.

2.6. Any calculations, formulas, raw and intermediate data used in this round can be provided to the Participant by request, except confidential information about other participants and information that may contain commercial secret.

3. GENERAL PROTOCOL FOR PROFECIENCY TESTING

3.1. MANAGEMENT SYSTEM.

3.1.1.The functioning management system of Metrology service Ltd. (further - Provider) complies with ISO\IEC 17043:2010[1] requirements and covers all aspects of proficiency testing(further - PT) for all proficiency tests.

3.2. SAMPLES PREPARATION, HOMOGENITY AND STABILITY

3.2.1. Provider has used a validated procedure and appropriate technical experts and contractors for the samples' selection, production, homogenization and division designs that is proved to be satisfactory for the purposes of PT programme PT.UA.1.1.2016 Round 2. Details of test material preparation and homogenization are not published in the report, though can be provided to the Participant by request. Tests, required to prove (validate) homogeneity and stability of samples were performed by competent contracting laboratories according to [2-8]. These results with statistics are published in the report.

3.2.2. Participants may contact the Provider to request details of test material selection, preparation, homogenization and division of those test material samples, for which they tested in PT. Such information can be provided to the Participant in confidence and only if it cannot compromise other Participants and/or is not a commercial secret.

3.3. DISPATCH AND RECEIPT OF SAMPLES

3.3.1. Samples of test material – **Wheat(*Tríticum aestívum*)** were dispatched 06.11.2017 according to schedule of proficiency testing programme PT.UA.1.1.2016 Round 2.

3.3.2. Each produced and identified sample was hermetically sealed.

3.3.3. A total of 22 participants in 2 countries received one sample. Results were returned from 22 participants.

3.4. FOLLOW-UP SERVICES

3.4.1. If a participant wishes to obtain advice/consultation on any aspect of their performance, one should contact the Provider. Provider can (with agreement with Participant) pass on the Participant's inquiry to a technical expert and/or contracting laboratory.

3.4.2. Surplus samples from this round are available for sale as certified reference materials(CRM) with the certified values and uncertainties. Please e-mail Provider for details.

3.5. PERFORMANCE ASSESMENT

3.5.1. Provider expressed Participant's results as traditional z-scores according to [1].

3.5.2. The assigned value for each analyte was calculated as the robust mean of the trial data using Huber H15 method [2,3]

3.5.3 The target standard deviation for each analyte was chosen from either the appropriate form of the Horwitz equation, method trial standard deviation (if stated in the method from inter-laboratory comparisons), standard deviation from the previous trials (PT rounds), or the robust trial standard deviation, after the removal of outliers. The choice was made using current industry practices used in other collaborative trials and proficiency testing schemes.

3.5.4. z-Scores were deemed satisfactory if $|z| \leq 2$. z-Scores were deemed questionable if $2 < |z| \leq 3$(marked yellow in tables). If $|z| \geq 3$, the results were considered to be unsatisfactory (marked red in tables). The calculations were made according to [1,3,5].

3.5.5. Participant number 17 reported result by other method, than stated in PT.UA.1.1.2016 Round 2 Programme (ГОСТ 30498-97 instead of ГОСТ 27676-88). This result was assessed by the Provider.

3.5.6. Only 0.99% of all results in this round are considered to be unsatisfactory. 0.55% of all results were deemed unsatisfactory in Round 1.

4. HOMOGENITY AND STABILITY ASSESMENT

4.1. Samples were assessed for homogeneity and stability after blending and packing by selecting ten samples of material at random from all those produced. Six of these samples were tested in duplicate under repeatability conditions as only 40 samples were produced according to [7]. Four other samples for stability tests were stored in appropriate conditions for the period of preparation and test submission for this round. They were also tested in duplicate.

4.2. Statistical analysis of the resulting data for homogeneity and stability was carried out using the industry standard Cochran's 'C' test and analytical variance test for 'sufficient homogeneity' according to [3,4].

4.3. Produced samples were found to be sufficiently homogeneous and stable for every analyte according to programme, except for those that can be considered equivalent or homogeneity can be assumed from other analyte homogeneity.

4.4. ISO 712:2009 Moisture content,%

ISO 712:2009 Вміст вологи, %										
ISO 712:2009 Moisture content,%										
Дослідження гомогенності/Homogenity test										
Аналіз викидів за тестом Кохрана(C -тест)/Cohran's C test for outliers						Аналіз на 'достатню однорідність'/Test for 'sufficient homogenity'				
Номер зразку/ Sample number	Результат/ Result A	Результат/ Result B	Average	SD²		Номер зразку/ Sample number	Результат/ Result A	Результат/ Result B	SUM	Difference²
1	12,4	12,38	12,39	0,0002	0,00	1	12,40	12,38	24,78	0,0004
2	12,43	12,39	12,41	0,0008	0,00	2	12,43	12,39	24,82	0,0016
3	12,34	12,37	12,36	0,0004	0,00	3	12,34	12,37	24,71	0,0009
4	12,29	12,36	12,33	0,0025	0,00	4	12,29	12,36	24,65	0,0049
5	12,36	12,35	12,36	0,0000	0,00	5	12,36	12,35	24,71	0,0001
6	12,34	12,35	12,35	0,0000	0,00	6	12,34	12,35	24,69	0,0001
7	12,36	12,44	12,40	0,0032	0,00	7	12,36	12,44	24,80	0,0064
8	12,39	12,27	12,33	0,0072	0,00	8	12,39	12,27	24,66	0,0144
9	12,39	12,4	12,40	0,0000	0,00	9	12,39	12,40	24,79	0,0001
10	12,31	12,38	12,35	0,0025	0,00	10	12,31	12,38	24,69	0,0049
										0,0338
Mean	12,365		Worst pair	0,0072		Mean	12,365			
Max	12,44		SUM of SD²	0,0169		Max	12,44			
Min	12,27		C	0,4260		Min	12,27			
			Ccr, 5%	0,602						
			Ccr, 1%	0,718		Analytical variance S²an	0,0017	SD	0,0424	
			Conclusion			Sanal	0,0411	RSDR	0,3426	
			5%	PASS		Ssums	0,0038			
			1%	PASS		MSb	0,0019			
					Between sample variance S²sam		0,0001			
Remarks										
1. Cohran's C test is described in ISO 5727-2 and FAPAS protocol, sixth edition, 2002										
2. Test for 'sufficient homogenity' is performed according to FAPAS protocol, sixth edition, 2002										

Source of σp value to use		
Use(write '1')	Source	σp
	C>13.8%, HORWITZ	0,3516
1	120ppb<C<13.8%, HORWITZ	0,3387
	C<120 ppb	2,720300
MASS NEGATIVE POWER FOR HORWITZ EQUATION(%=2, ppb=9,ppm=6)		2
	SD	4,2700
	Trial SD	3,9800
	Target SD chosen	0,3387
	σ²all	0,010326
	Replicates	10
	F1	1,88
	F2	1,01
	Critical value	0,0211
	Between sample variance S²sam	0,0001
	Sufficient homogenity test	PASS

4.5. Data for all analytes

Method	ISO 712:2009	ISO 20483:2013	ISO 21415-2:2015	ISO 21415-2:2015	ГОСТ 13586.1-68	ГОСТ 13586.1-68	ISO 7971-3:2009	ISO 3093:2009	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	ГОСТ 30483-97/ ДСТУ 3768:2010
	Moisture content, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein	Wet gluten content, %	Gluten Index, %	Wet gluten content, %	Index of gluten deformation	Bulk density, kg/hl	Falling number, s	Broken grains, %	Grain impurities, %	Sprouted grains, %	Miscellaneous impurities, %	Grains damaged by Bug, %
Homogenity and stability													
Cohran's 'C' test													
Crtitical value(5%,10pairs)=0,602	0,4260	0,3744	0,5928	0,2824	0,2974	0,2857	0,1952	0,2952	0,4327	0,4715	0,2143	0,2867	0,1904
Mean Result	12,3650	12,0470	23,2400	91,4000	22,3260	78,9000	79,6315	384,3500	4,0745	4,0285	0,1560	0,4265	1,1690
Conclusion	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
Analytical variance test													
S^2anal	0,0017	0,0039	0,0122	0,1162	0,1076	2,8000	0,0102	67,7500	0,0126	0,0178	0,0019	0,0045	0,0076
Sanal	0,0411	0,0621	0,1104	0,3408	0,3280	1,6733	0,1012	8,2310	0,1122	0,1335	0,0435	0,0668	0,0871
S^2sample	0,0001	0,0047	0,0187	0,3004	0,0000	4,7000	0,0048	8,5167	0,0207	0,0591	0,0000	0,0005	0,0089
σ_p	0,3387	0,3313	1,0000	1,2160	1,4000	6,4000	0,3600	17,6200	0,9010	0,7420	0,1700	0,1670	0,4920
σ_p source	Horwitz	Horwitz	Method SD	Trial SD	Trial SD	Trial SD	Method SD	Trial SD	Method SD	Trial SD	Method SD	Trial SD	Trial SD
σ^2all	0,0103	0,0099	0,0900	0,1331	0,1764	3,6864	0,0117	27,9418	0,0731	0,0496	0,0026	0,0025	0,0218
Critical value	0,0211	0,0225	0,1815	0,3675	0,4403	9,7584	0,0323	120,9581	0,1501	0,1112	0,0068	0,0092	0,0486
Conclusion	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

5. DATA SUMMARY

Method	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	ISO 20483:2013	Express - infrared spectroscopy method, calibrated to ISO 20483	ISO 21415-2:2015	ISO 21415-2:2015	ISO 712:2009	Express - infrared spectroscopy method, calibrated to ISO 712	ISO 7971-3:2009	ISO 3093:2009	ГОСТ30483-97/ ДСТУ 3768:2010	ГОСТ 30483-97/ ДСТУ 3768:2010	ГОСТ 30483-97/ ДСТУ 3768:2010	ГОСТ 10846-91	Express - infrared spectroscopy method, calibrated to GOST 10846	ГОСТ 13586.1-68	ГОСТ 13586.1-68	ГОСТ 13586.5-93	Express - infrared spectroscopy method, calibrated to GOST 13586.5	ДСТУ 4234:2003	ГОСТ 27676-88	ГОСТ 10840-64
	Broken grains, %	Grain impurities, %	Sprouted grains, %	Miscellaneous impurities, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Wet gluten content, %	Gluten Index, %	Moisture content, %	Moisture content, %	Bulk density, kg/hl	Falling number, s	Foreign impurities, %	Grain impurities, %	Grains damaged by Bug, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Wet gluten content, %	Index of gluten deformation	Moisture content, %	Moisture content, %	Bulk density, kg/hl	Falling number, s	Test weight, g/l
No of Results	11	11	11	11	8	9	10	10	11	9	10	12	19	19	18	11	9	16	15	21	7	8	16	19
No of Results|z|>3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
No of Results|z|>3, %	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	10,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	10,526
Mean	4,954	3,849	0,268	0,616	11,970	11,906	22,739	90,301	12,178	12,137	79,370	362,417	0,646	7,498	1,155	11,949	11,781	21,288	77,733	11,775	12,029	78,900	362,250	785,316
Min	3,700	2,700	0,000	0,430	11,750	11,770	20,300	88,150	11,756	11,990	77,200	342,000	0,420	6,100	0,300	11,600	11,500	19,000	60,000	11,200	11,800	77,200	336,000	765,000
Max	6,620	5,040	0,560	0,860	12,080	12,120	24,900	92,360	12,350	12,300	80,200	391,000	1,100	8,810	2,100	12,300	12,100	24,200	91,000	12,200	12,300	79,700	398,000	792,000
SD	0,915	0,694	0,153	0,167	0,097	0,111	1,252	1,216	0,172	0,110	0,837	17,952	0,170	0,873	0,492	0,204	0,159	1,400	8,172	0,338	0,206	1,010	16,377	6,880
Median	5,020	3,680	0,220	0,540	11,990	11,880	22,955	90,250	12,190	12,190	79,500	363,000	0,600	7,610	1,195	11,920	11,800	21,035	78,000	11,900	12,000	79,400	359,000	787,000
Robust mean(assigned value)	4,913	3,805	0,284	0,616	11,988	11,896	22,774	90,312	12,203	12,137	79,537	362,222	0,628	7,504	1,159	11,949	11,776	21,464	78,268	11,810	12,029	78,995	360,601	786,926
Robust SD	0,841	0,514	0,109	0,167	0,046	0,094	0,893	1,002	0,116	0,110	0,399	17,623	0,128	0,862	0,429	0,176	0,086	1,133	6,422	0,278	0,206	0,836	11,852	2,620
SD from method(Tr.SD)	0,901	1,420	0,170	0,350	0,280	N/A	1,000	6,000	N/A	N/A	0,360	36,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SD from Horwitz eq.	0,159	0,128	0,013	0,027	0,329	0,328	0,477	N/A	0,335	0,333	N/A	N/A	0,027	0,222	0,051	0,329	0,325	0,461	N/A	0,326	0,331	N/A	N/A	N/A
Target SD	0,901	0,742	0,170	0,167	0,329	0,328	1,000	1,216	0,335	0,333	0,360	17,623	0,210	0,862	0,492	0,329	0,325	1,400	6,422	0,326	0,331	0,836	16,377	4,600
Source of target SD of PT	Method Tr SD	Trial SD	Method Tr SD	Trial SD	Horwitz	Horwitz	Trial SD	Trial SD	Horwitz	Horwitz	Method Tr SD	Trial SD	Trail SD	Trial SD	Trial SD	Horwitz	Horwitz	Trial SD	Trial SD	Horwitz	Horwitz	Trial SD	Method SD	Trial SD

6. RAW DATA

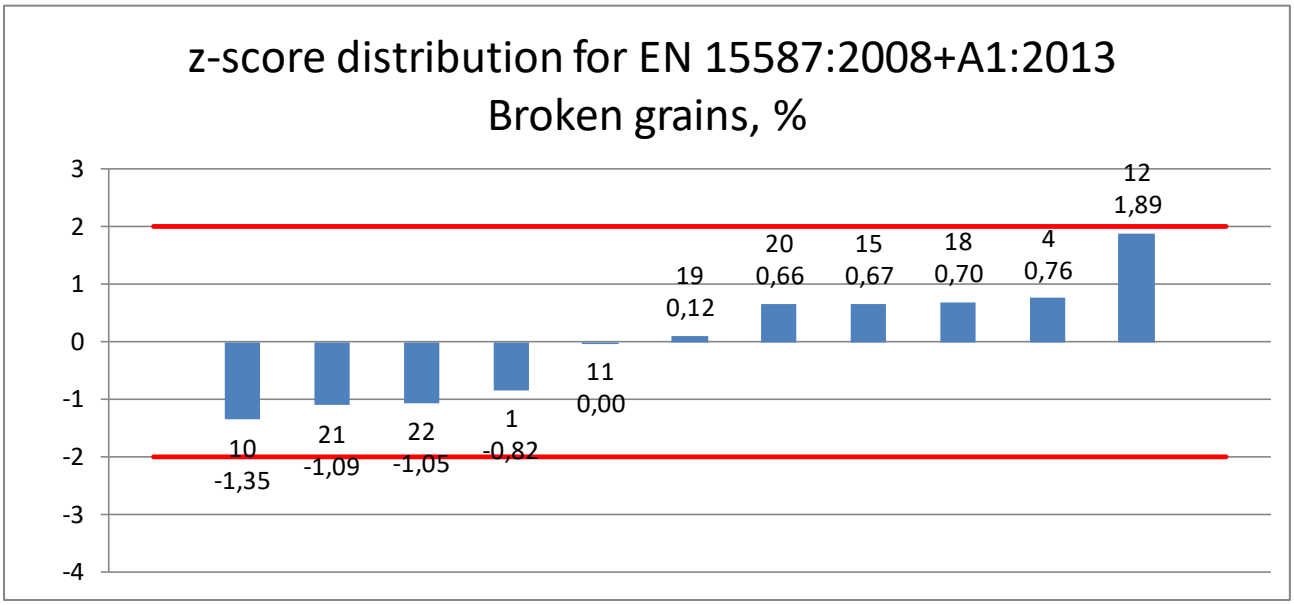
Method	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	ISO 20483:2013	Express - infrared spectroscopy method, calibrated to ISO	ISO 21415-2:2015	ISO 21415-2:2015	ISO 712:2009	Express - infrared spectroscopy method, calibrated to ISO 712	ISO 7971-3:2009	ISO 3093:2009	ГОСТ3048 3-97/ ДСТУ 3768:2010	ГОСТ 30483-97/ ДСТУ 3768:2010	ГОСТ 30483-97/ ДСТУ 3768:2010	ГОСТ 10846-91	Express - infrared spectroscopy method, calibrated to GOST	ГОСТ 13586.1-68	ГОСТ 13586.1-68	ГОСТ 13586.5-93	Express - infrared spectroscopy method, calibrated	ДСТУ 4234:2003	ГОСТ 27676-88	ГОСТ 10840-64
Laboratory number	Broken grains, %	Grain impurities, %	Sprouted grains, %	Miscellaneous impurities, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Wet gluten content, %	Gluten Index, %	Moisture content, %	Moisture content, %	Bulk density, kg/hl	Falling number, s	Foreign impurities, %	Grain impurities, %	Grains damaged by Bug, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Wet gluten content, %	Index of gluten deformation	Moisture content, %	Moisture content, %	Bulk density, kg/hl	Falling number, s	Test weight, g/l
1	4,17	4,17	0,14	0,45	12,08		22,85	92,36	12,35		79,60	391	0,43	7,36	1,14	11,98		22,28	78	12,20		79,60	389	789
3							21,93	88,15	11,76				0,42	7,90	1,30		11,50	22,96	91	11,60	11,80		364	786
4	5,60	3,58	0,41	0,86	11,97		23,10	91,00	12,25			360	0,80	8,00	1,70					11,90				
5													0,60	6,50	0,90		11,80	21,00	75	12,00			354	788
6													0,90	6,40	0,80		11,80	21,00	75	12,10	12,30		354	792
7													0,80	7,70	0,90		11,70	20,80	75	12,10	12,00		350	789
8						11,77				12,10		380	0,60	6,10	0,30	11,60	11,76	19,00	60	12,00	12,20	77,40	383	769
9													0,70	6,20	0,80		11,70	21,00	70	12,10			360	790
10	3,70	2,70	0,00	0,50	11,75	11,80	21,50	91,50	12,35	12,20	77,20	373	0,50	6,30	0,40	11,75	11,80	19,00	66	12,00	12,20	77,20	373	765
11	4,91	3,90	0,56	0,81	12,03	12,12	20,30	90,50		11,99	79,40	342	0,68	7,12	2,10		12,10	23,00			11,80	79,40	343	787
12	6,62	3,53	0,25	0,43		11,80	22,91	90,00	12,10	12,30	79,40	343	0,53	8,67	1,70			21,07	76	11,70		79,40	336	787
13													0,52	7,61		12,30		20,20	80	11,20				784
14													1,10	8,57	0,47	11,81		22,00	85	11,20			359	786
15	5,52	3,60	0,40	0,86	11,98		23,00	90,00	12,10		79,60	345	0,76	7,84	1,67	11,87		21,60	85	11,90		79,70	355	790
16													0,50	7,58		12,20		20,10	80	11,20				785
17																				11,64			398	791
18	5,54	3,20	0,20	0,70		11,98			12,10	12,00	79,30	345	0,62	7,30	1,40		11,87	21,40	85	11,90	11,90		355	786
19	5,02	3,96	0,36	0,65	11,95	11,88	24,90	89,00	12,16	12,20	79,80	345	0,65	8,81	1,15	11,97		24,20	85	11,52		79,50	359	788
20	5,51	3,68	0,22	0,54		11,88			12,35	12,03	79,10	366	0,57	8,63	1,24					11,73		79,00	364	784
21	3,93	5,04	0,21	0,48	12,00	11,96	23,30	89,70	12,25	12,22	80,10	379			1,42	11,92				12,03				
22	3,97	4,98	0,20	0,50	12,00	11,96	23,60	90,80	12,19	12,19	80,20	380			1,40	11,90				12,05				
23													0,59	7,87		12,14				11,20				785

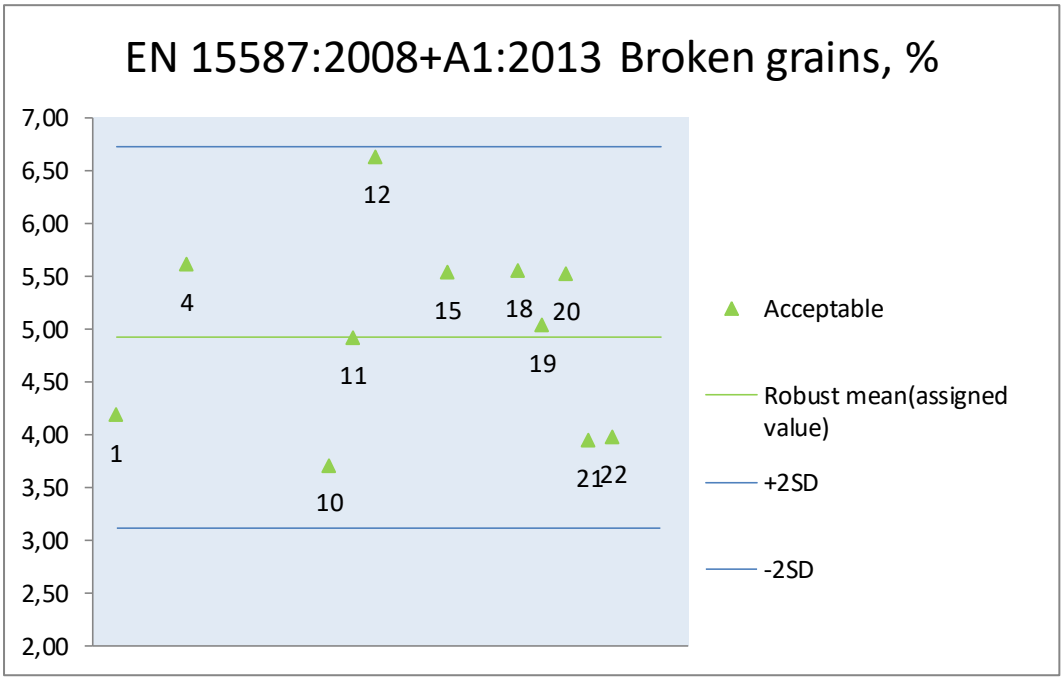
7. Z SCORES

Method	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	EN 15587:2008+A1:2013	ISO 20483:2013	Express - infrared spectroscopy method, calibrated to ISO 20483	ISO 21415-2:2015	ISO 21415-2:2015	ISO 712:2009	Express - infrared spectroscopy method, calibrated to ISO 712	ISO 7971-3:2009	ISO 3093:2009	ГОСТ30483-97/ ДСТУ 3768:2010	ГОСТ 30483-97/ ДСТУ 3768:2010	ГОСТ 30483-97/ ДСТУ 3768:2010	ГОСТ 10846-91	Express - infrared spectroscopy method, calibrated to GOST 10846	ГОСТ 13586.1-68	ГОСТ 13586.1-68	ГОСТ 13586.5-93	Express - infrared spectroscopy method, calibrated to GOST 13586.5	ДСТУ 4234:2003	ГОСТ 27676-88	ГОСТ 10840-64
Laboratory number	Broken grains, %	Grain impurities, %	Sprouted grains, %	Miscellaneous impurities, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Wet gluten content, %	Gluten Index, %	Moisture content, %	Moisture content, %	Bulk density, kg/hl	Falling number, s	Foreign impurities, %	Grain impurities, %	Grains damaged by Bug, %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %	Wet gluten content, %	Index of gluten deformation	Moisture content, %	Moisture content, %	Bulk density, kg/hl	Falling number, s	Test weight, g/l
1	-0,82	0,49	-0,85	-1,00	0,28		0,08	1,68	0,44		0,17	1,63	-0,94	-0,17	-0,04	0,09		0,58	-0,04	1,20		0,72	1,73	0,45
3							-0,84	-1,78	-1,33				-0,99	0,46	0,29		-0,85	1,07	1,98	-0,64	-0,69		0,21	-0,20
4	0,76	-0,30	0,74	1,46	-0,06		0,33	0,57	0,14			-0,13	0,82	0,58	1,10					0,28				
5													-0,13	-1,16	-0,53		0,07	-0,33	-0,51	0,58			-0,40	0,23
6													1,30	-1,28	-0,73		0,07	-0,33	-0,51	0,89	0,82		-0,40	1,10
7													0,82	0,23	-0,53		-0,23	-0,47	-0,51	0,89	-0,09		-0,65	0,45
8						-0,39				-0,11		1,01	-0,13	-1,63	-1,74	-1,06	-0,05	-1,76	-2,84	0,58	0,52	-1,91	1,37	-3,90
9													0,34	-1,51	-0,73		-0,23	-0,33	-1,29	0,89			-0,04	0,67
10	-1,35	-1,49	-1,67	-0,70	-0,72	-0,29	-1,27	0,98	0,44	0,19	-6,49	0,61	-0,61	-1,40	-1,54	-0,60	0,07	-1,76	-1,91	0,58	0,52	-2,15	0,76	-4,77
11	0,00	0,13	1,62	1,16	0,13	0,68	-2,47	0,15		-0,44	-0,38	-1,15	0,25	-0,44	1,91		1,00	1,10			-0,69	0,48	-1,07	0,02
12	1,89	-0,37	-0,20	-1,12		-0,29	0,14	-0,26	-0,31	0,49	-0,38	-1,09	-0,47	1,35	1,10			-0,28	-0,35	-0,34		0,48	-1,50	0,02
13													-0,51	0,12		1,07		-0,90	0,27	-1,87				-0,64
14													2,25	1,24	-1,40	-0,42		0,38	1,05	-1,87			-0,10	-0,20
15	0,67	-0,28	0,68	1,46	-0,03		0,23	-0,26	-0,31		0,17	-0,98	0,63	0,39	1,04	-0,24		0,10	1,05	0,28		0,84	-0,34	0,67
16													-0,61	0,09		0,76		-0,97	0,27	-1,87				-0,42
17																				-0,52			2,28	0,89
18	0,70	-0,81	-0,49	0,50		0,25			-0,31	-0,41	-0,66	-0,98	-0,04	-0,24	0,49		0,29	-0,05	1,05	0,28	-0,39		-0,34	-0,20
19	0,12	0,21	0,45	0,20	-0,12	-0,05	2,13	-1,08	-0,13	0,19	0,73	-0,98	0,10	1,52	-0,02	0,06		1,95	1,05	-0,89		0,60	-0,10	0,23
20	0,66	-0,17	-0,38	-0,46		-0,05			0,44	-0,32	-1,21	0,21	-0,28	1,31	0,17					-0,24		0,01	0,21	-0,64
21	-1,09	1,67	-0,43	-0,82	0,04	0,19	0,53	-0,50	0,14	0,25	1,56	0,95			0,53	-0,09				0,68				
22	-1,05	1,58	-0,49	-0,70	0,04	0,19	0,83	0,40	-0,04	0,16	1,84	1,01			0,49	-0,15				0,74				
23													-0,18	0,43		0,58				-1,87				-0,42

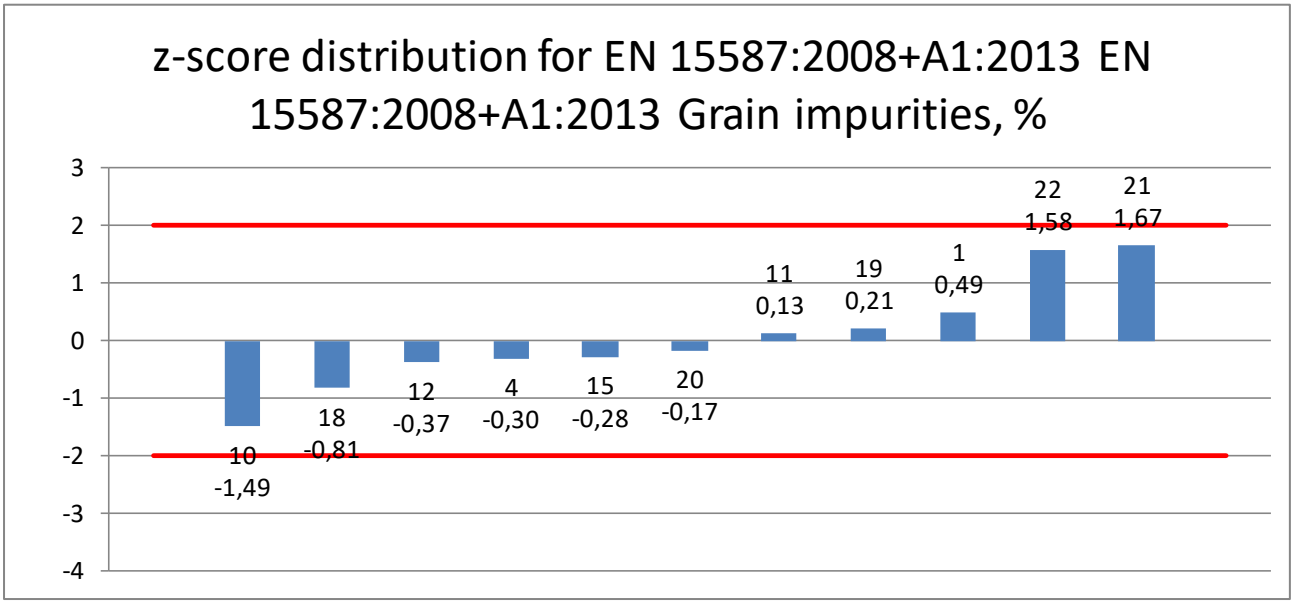
8. Z SCORE PLOTS AND RESULTS CHARTS.

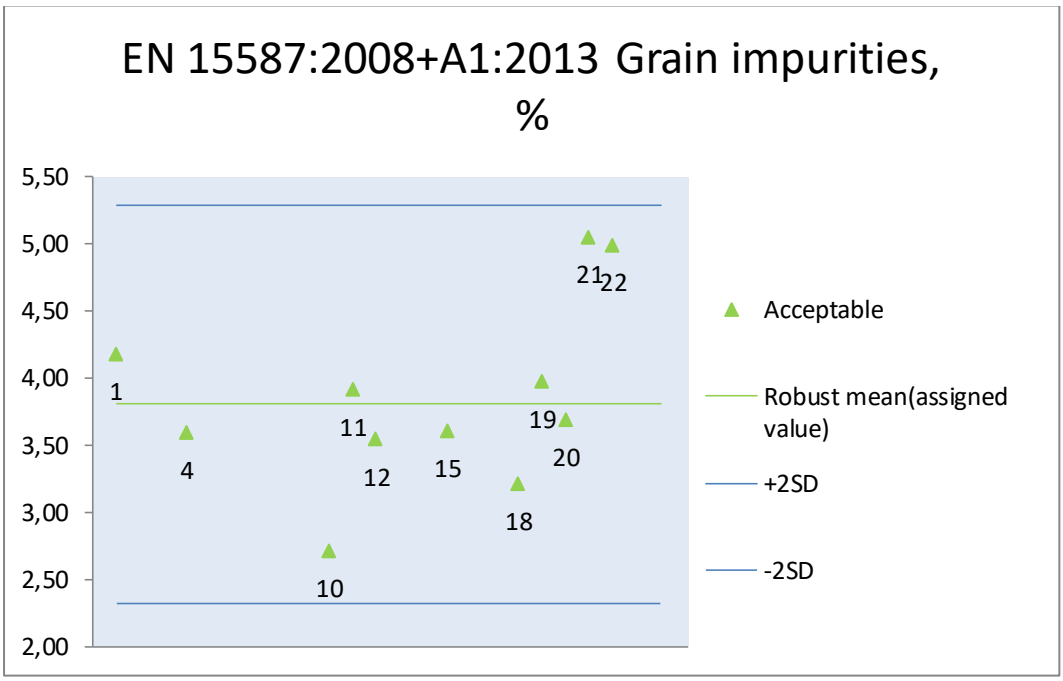
8.1. EN 15587:2008+A1:2013 Broken grains, %



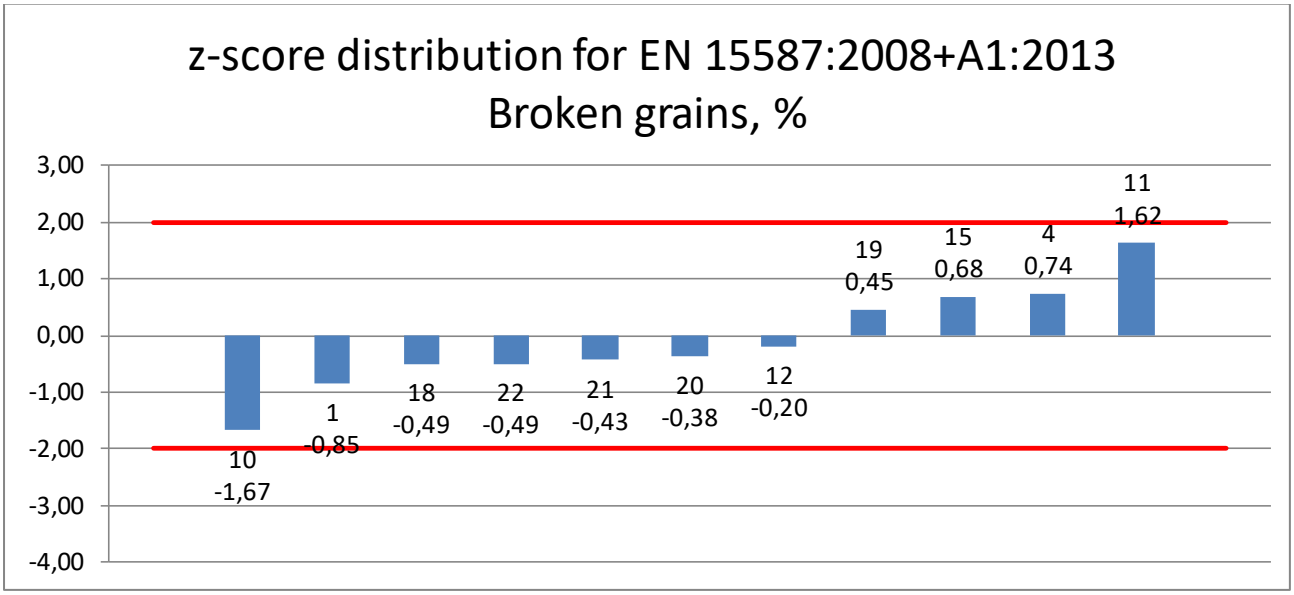


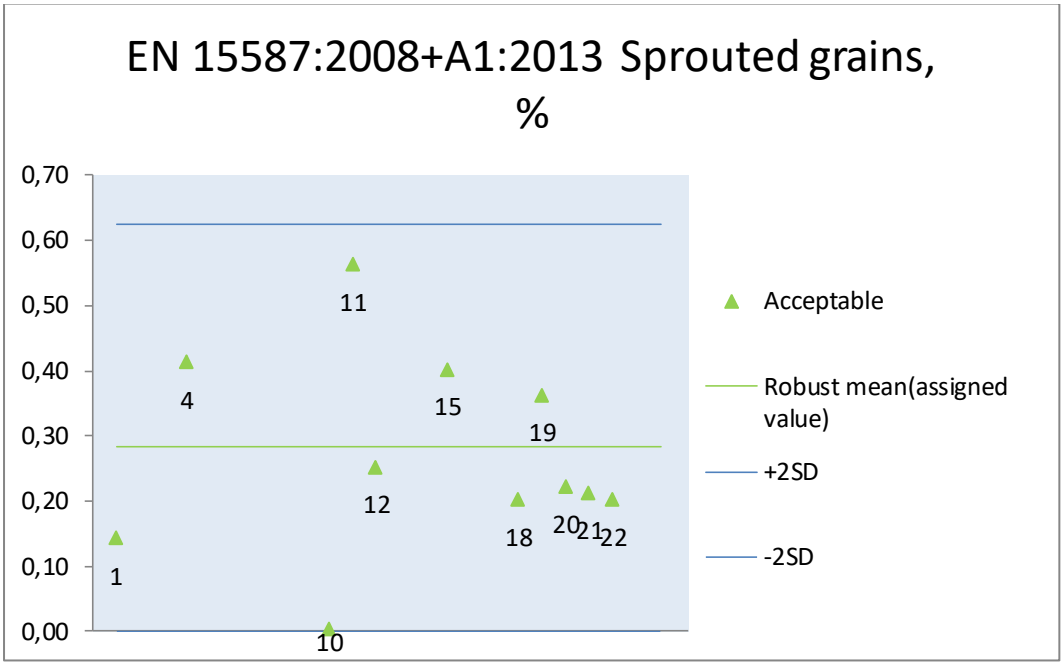
8.2. EN 15587:2008+A1:2013 Grain impurities, %



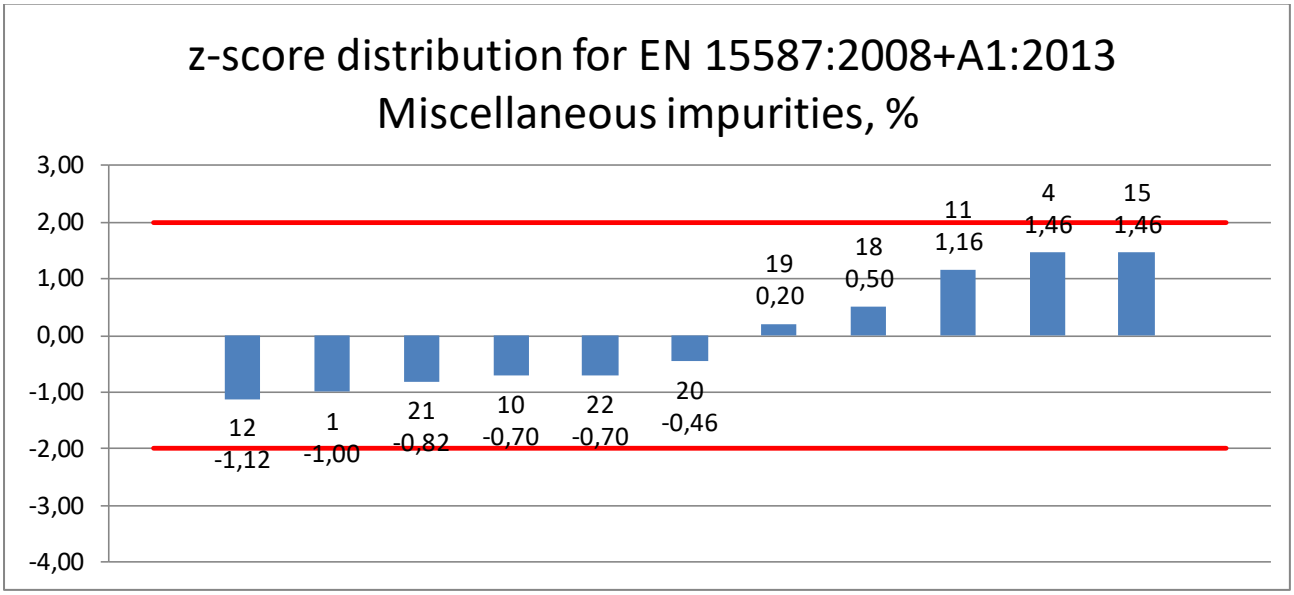


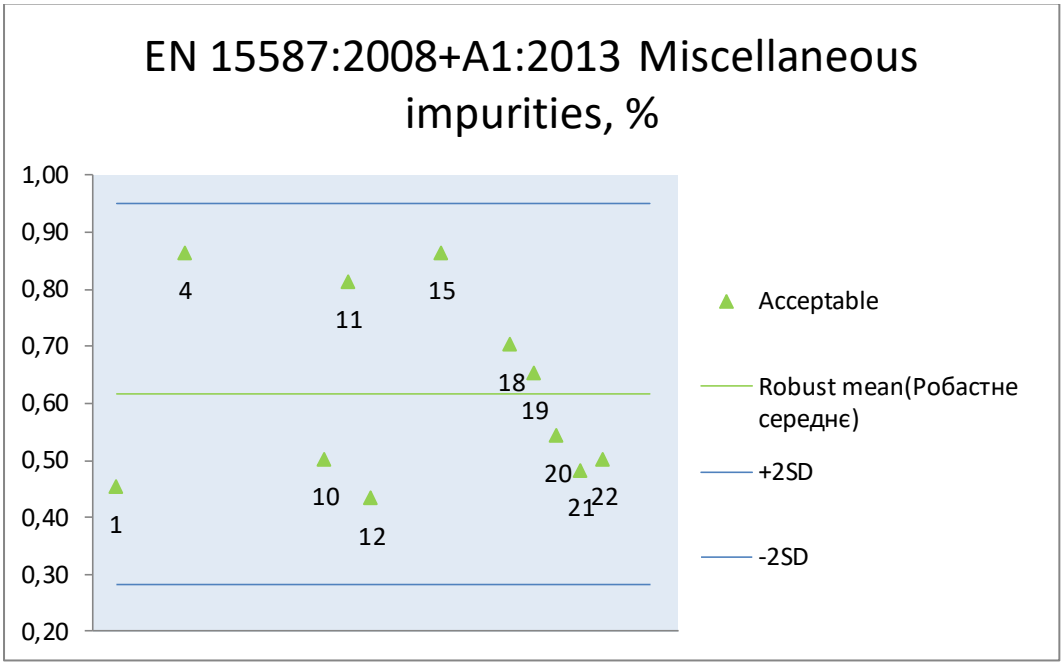
8.3. EN 15587:2008+A1:2013 Broken grains, %



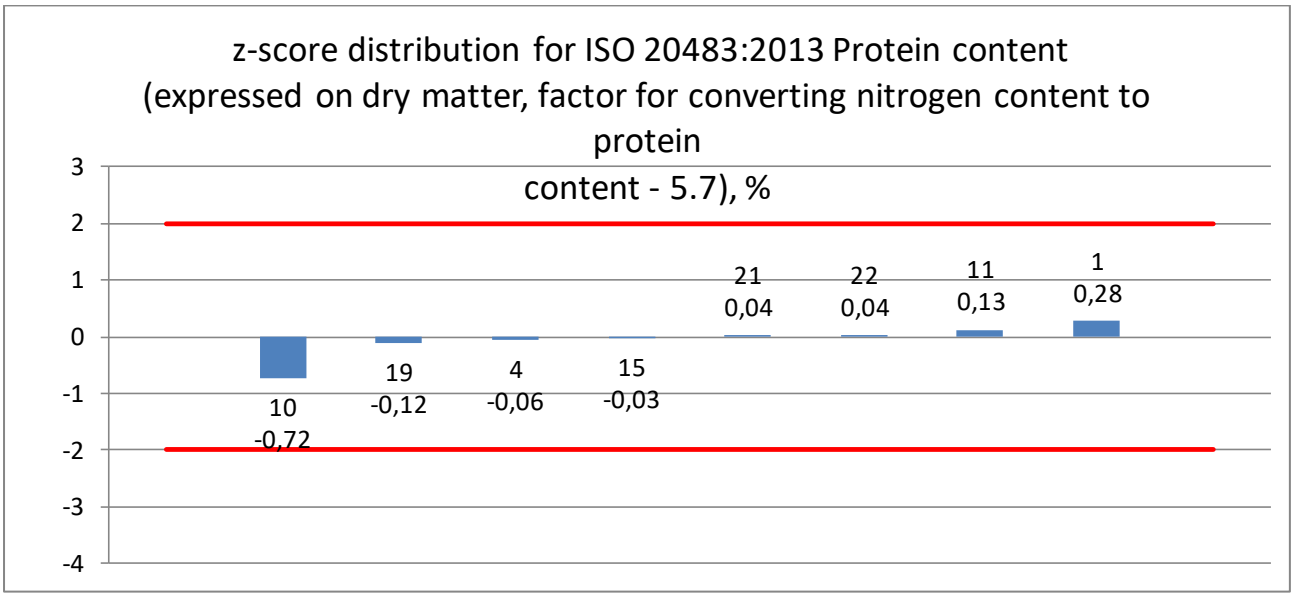


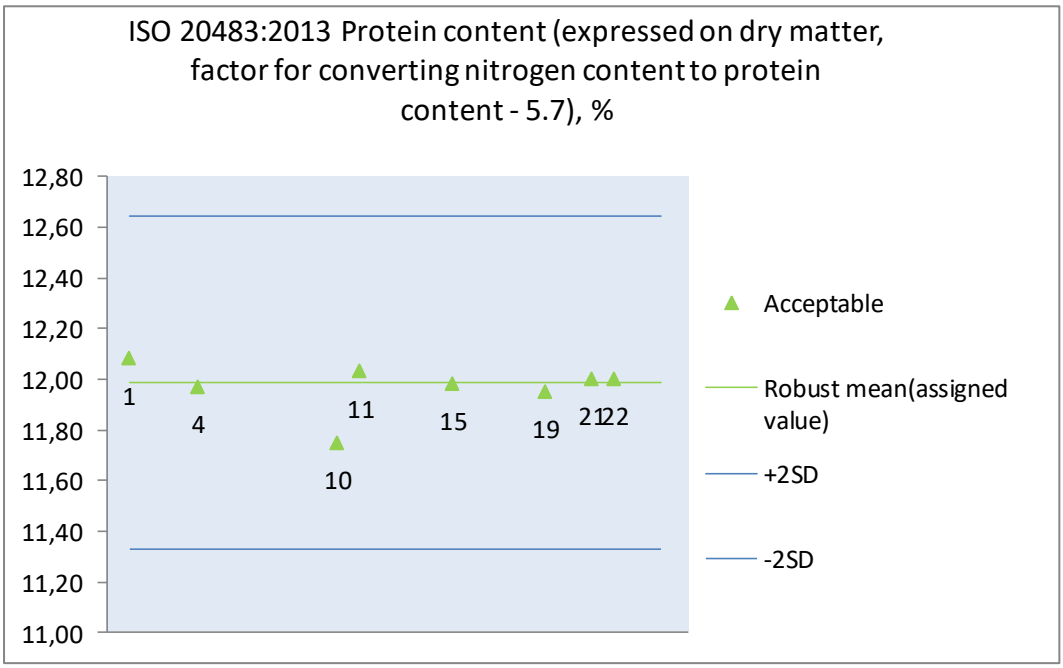
8.4. EN 15587:2008+A1:2013 Miscellaneous impurities, %



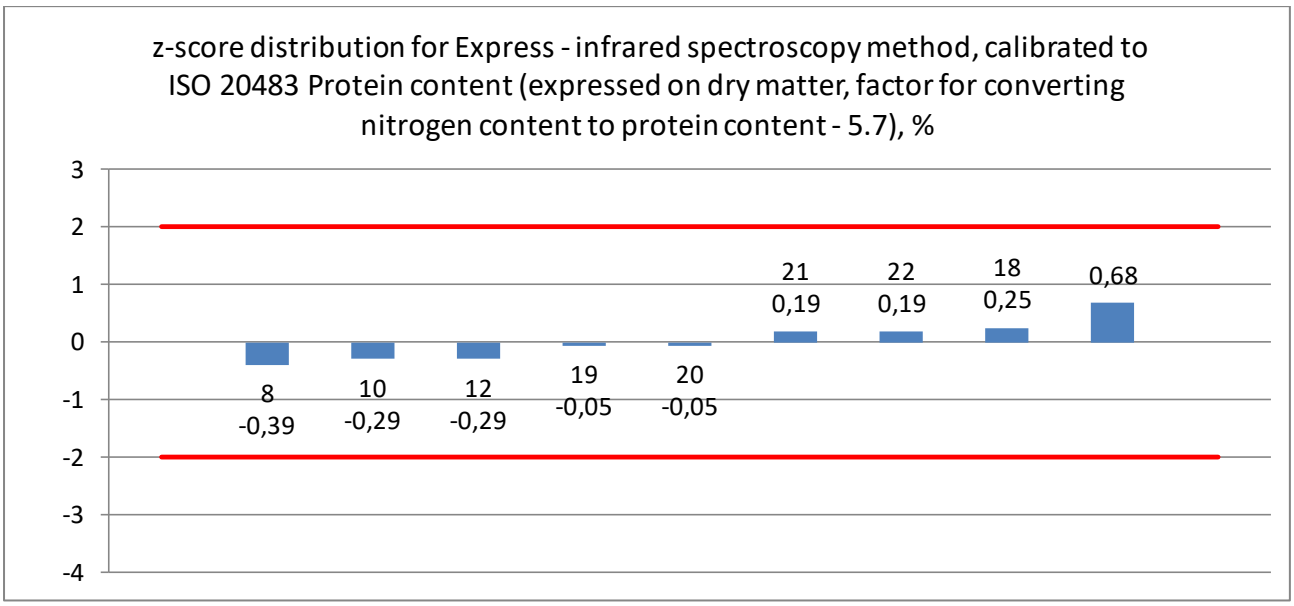


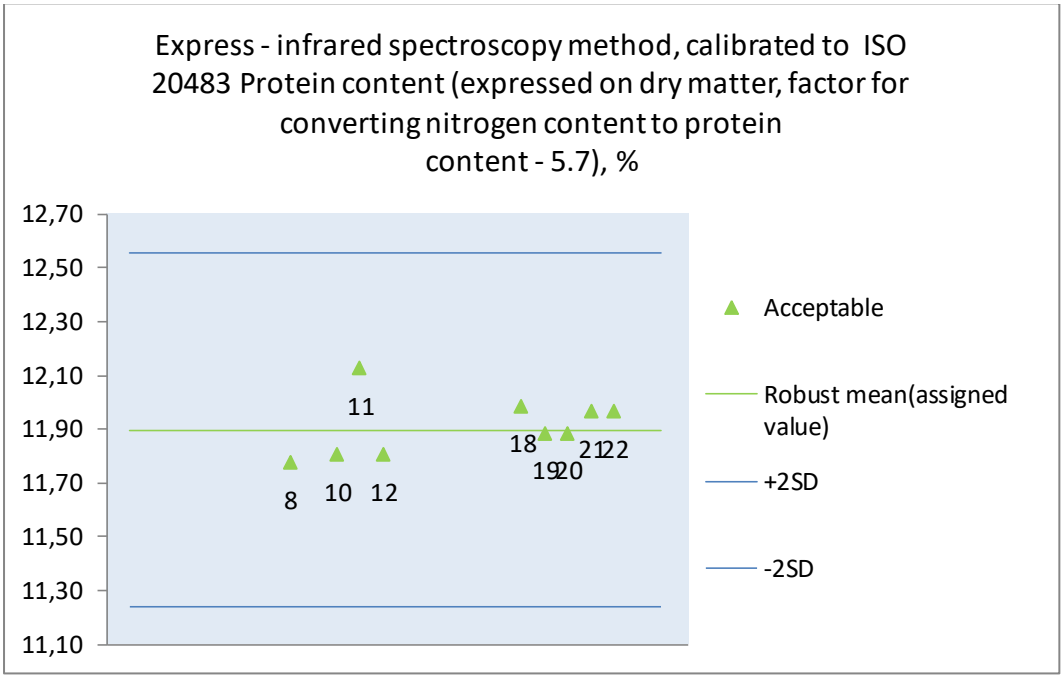
8.5. ISO 20483:2013 Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %



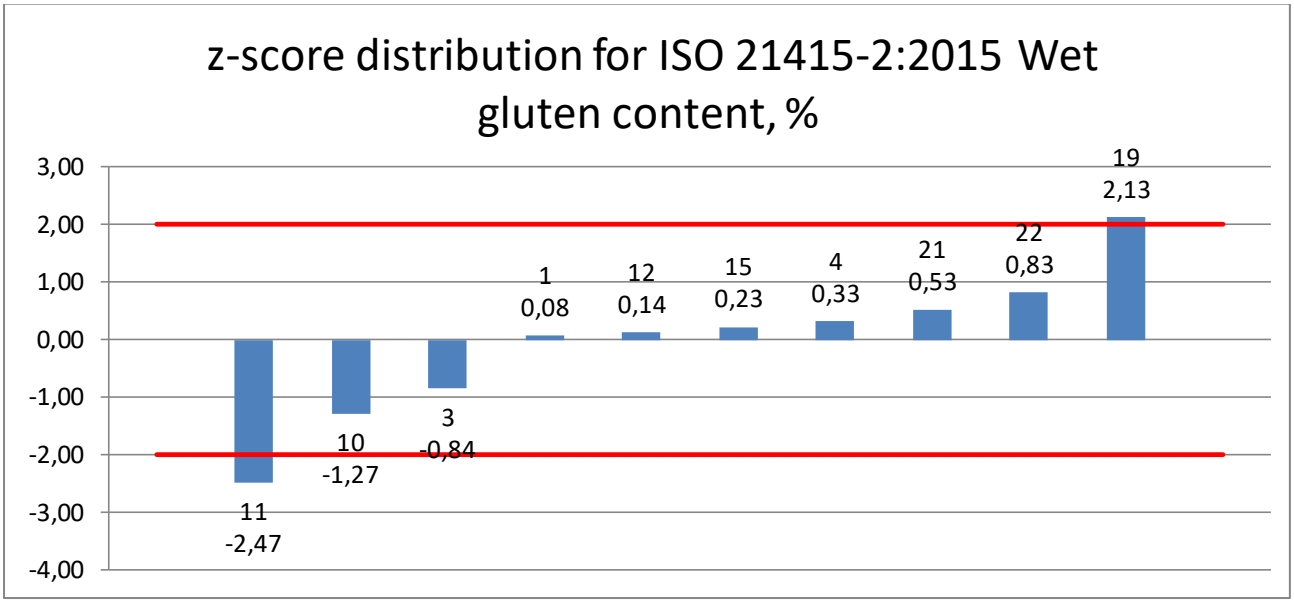


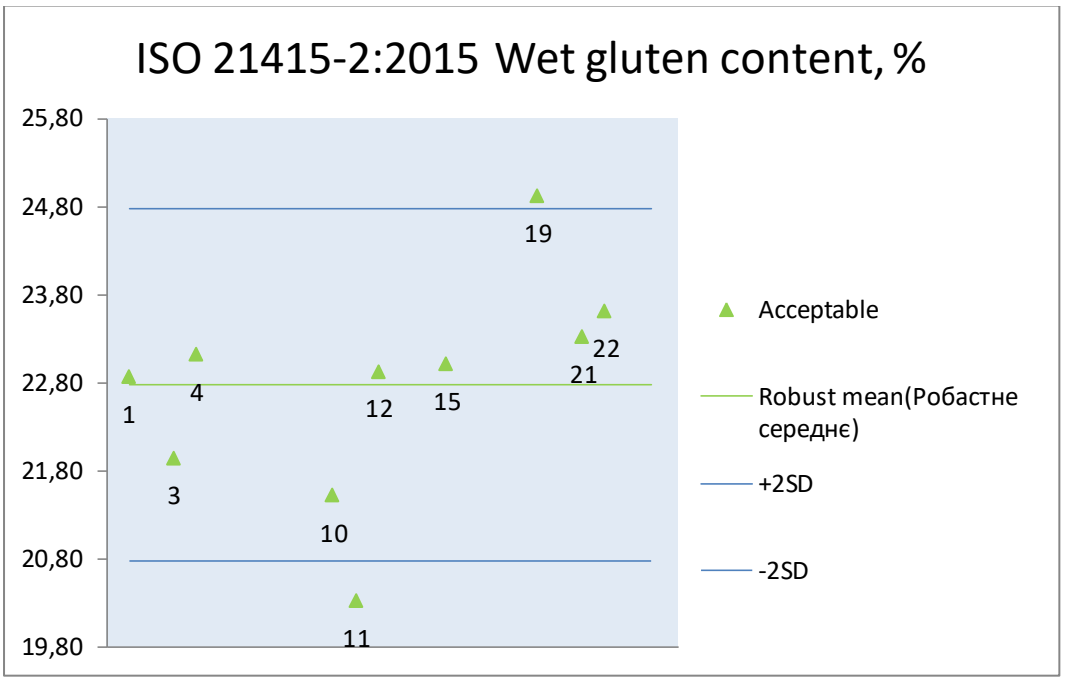
8.6. Express - infrared spectroscopy method, calibrated to ISO 20483 Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %



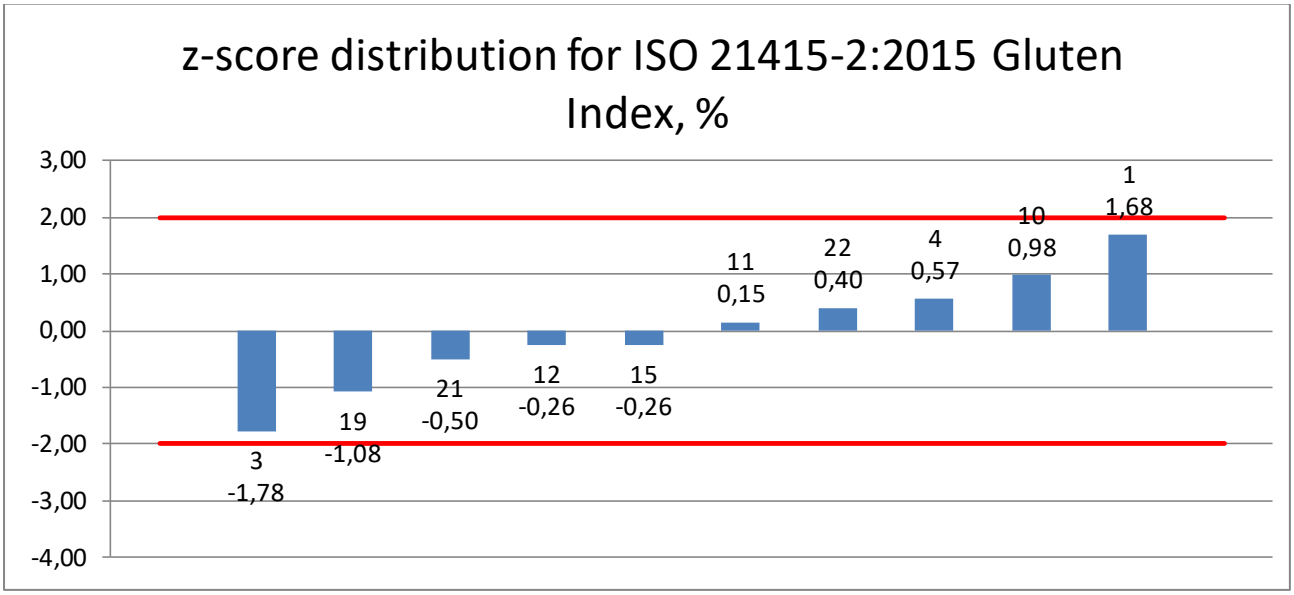


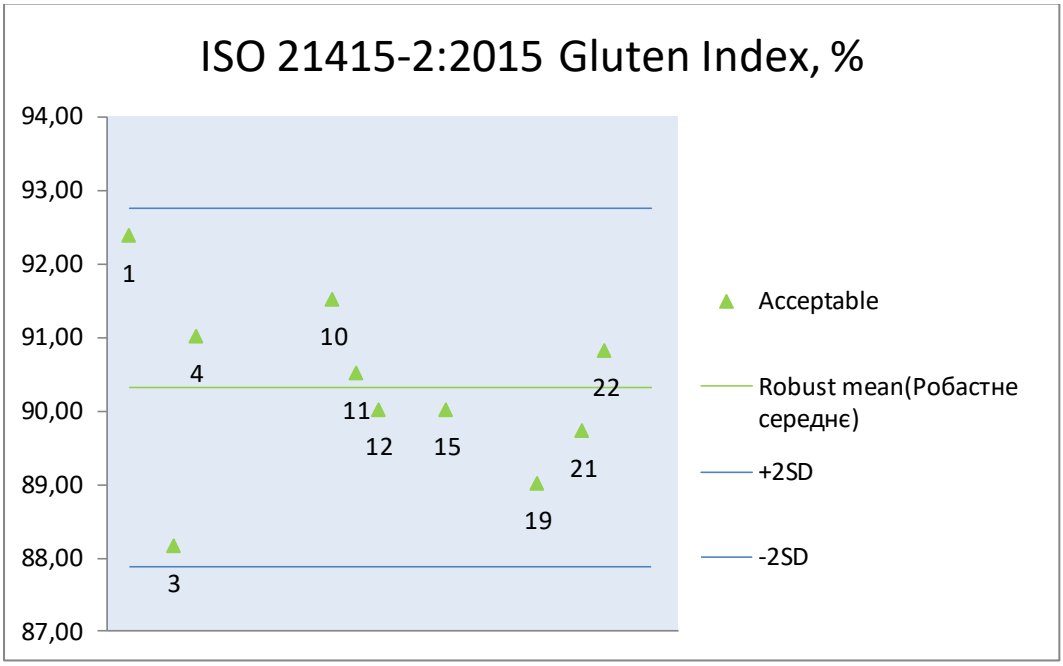
8.7. ISO 21415-2:2015 Wet gluten content,



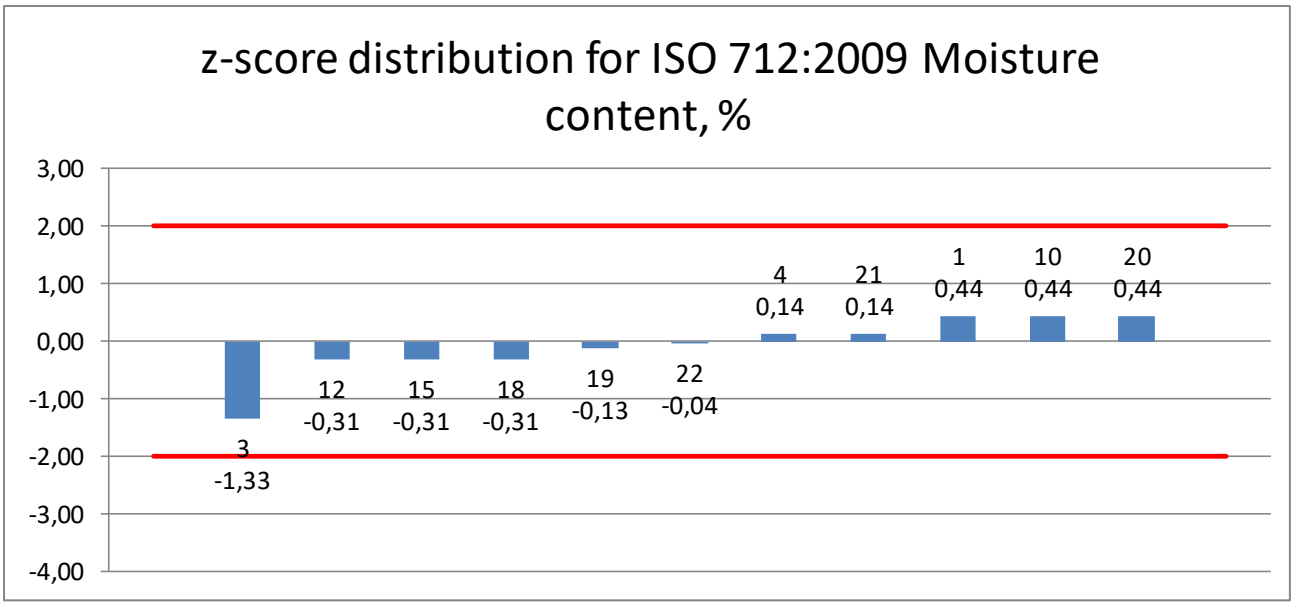


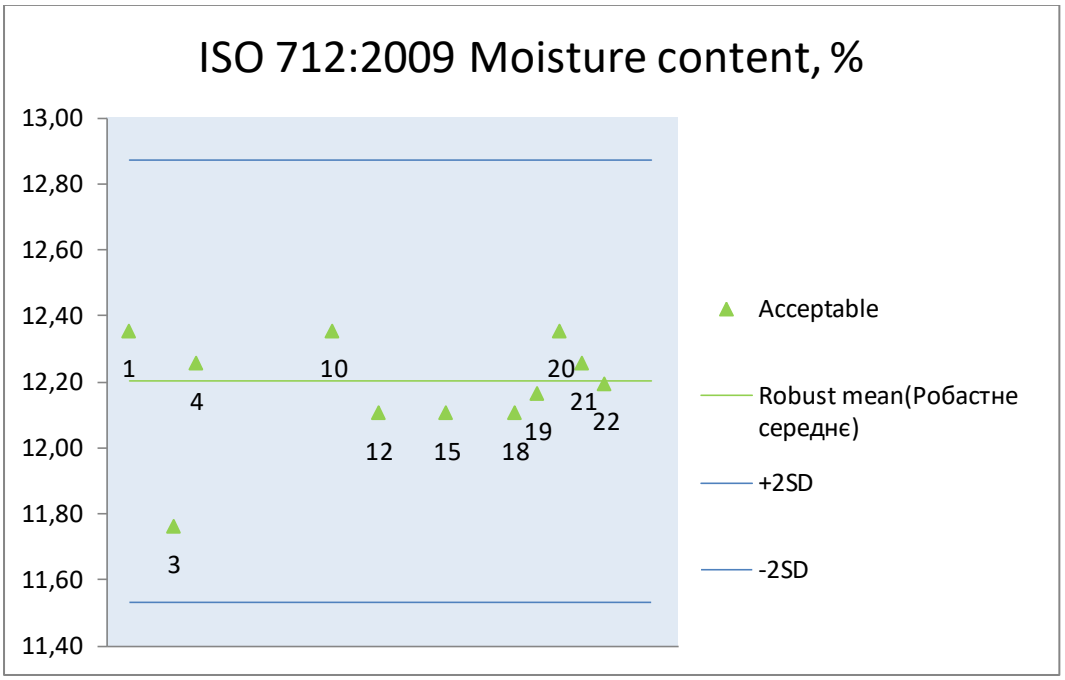
8.8. ISO 21415-2:2015 Gluten Index, %



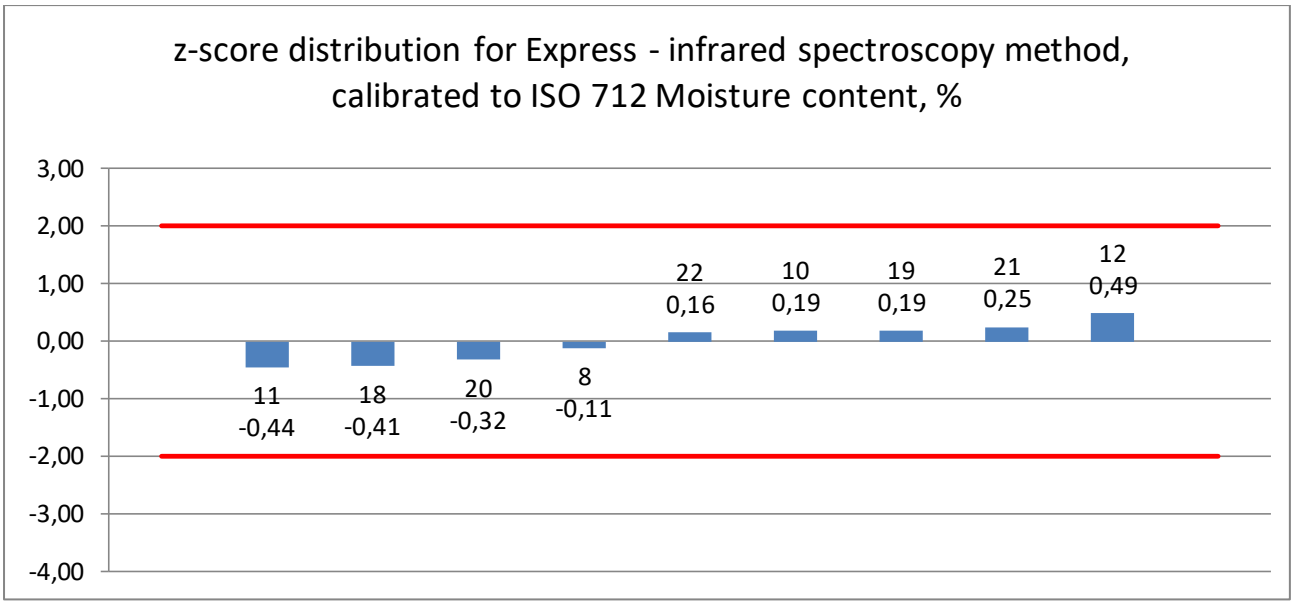


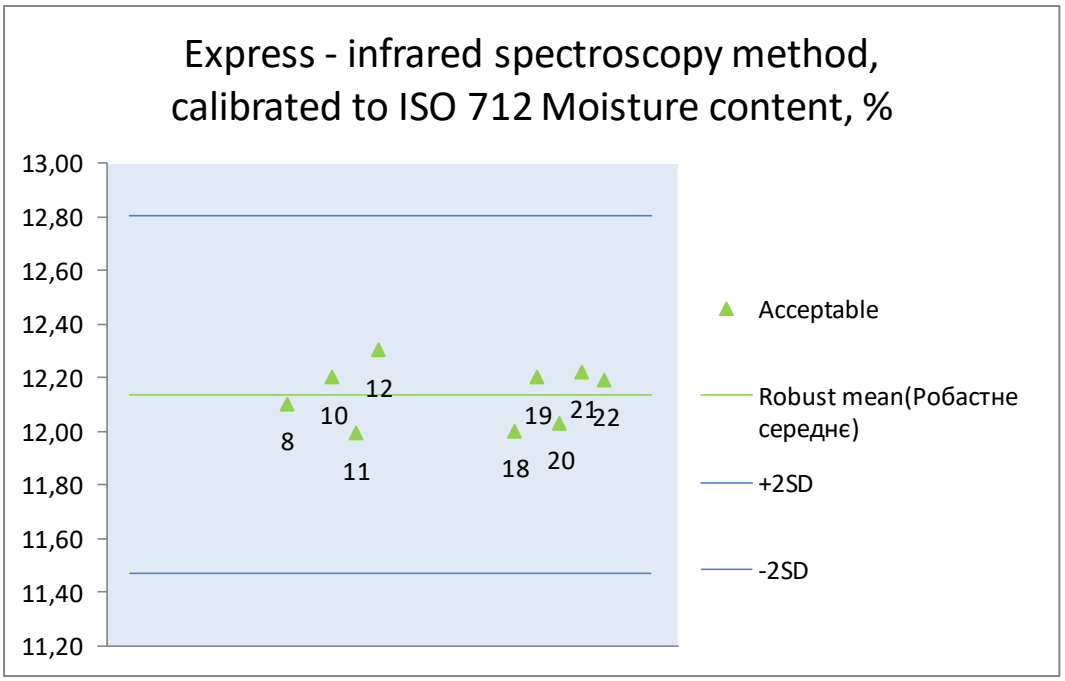
8.9. ISO 712:2009 Moisture content, %



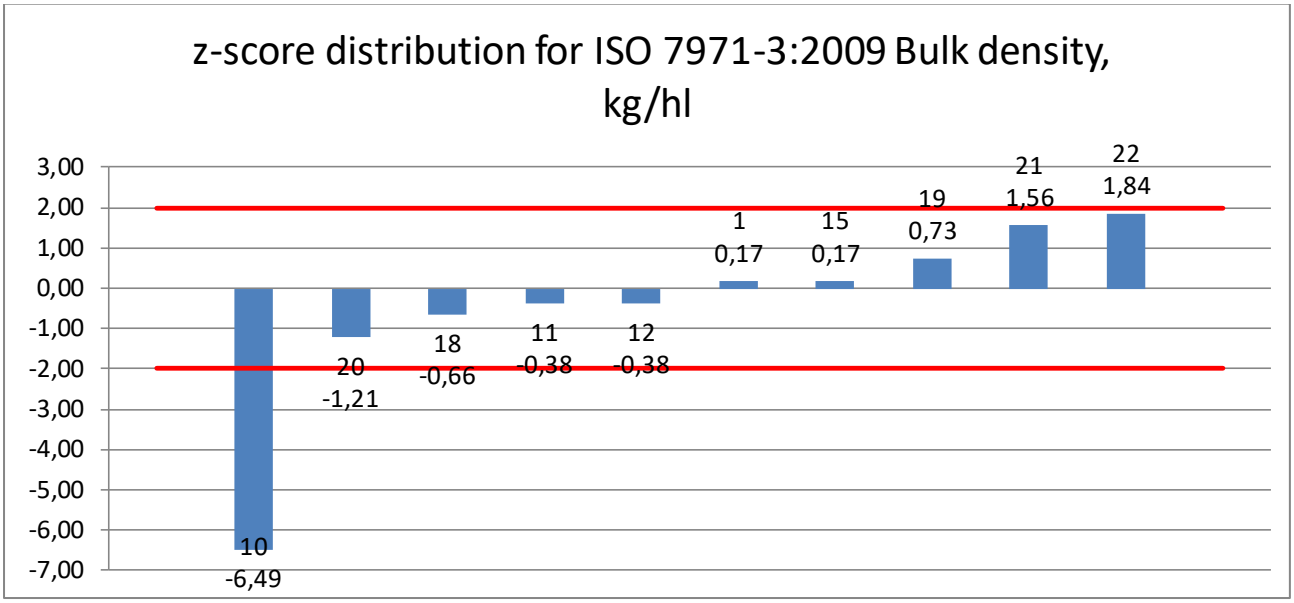


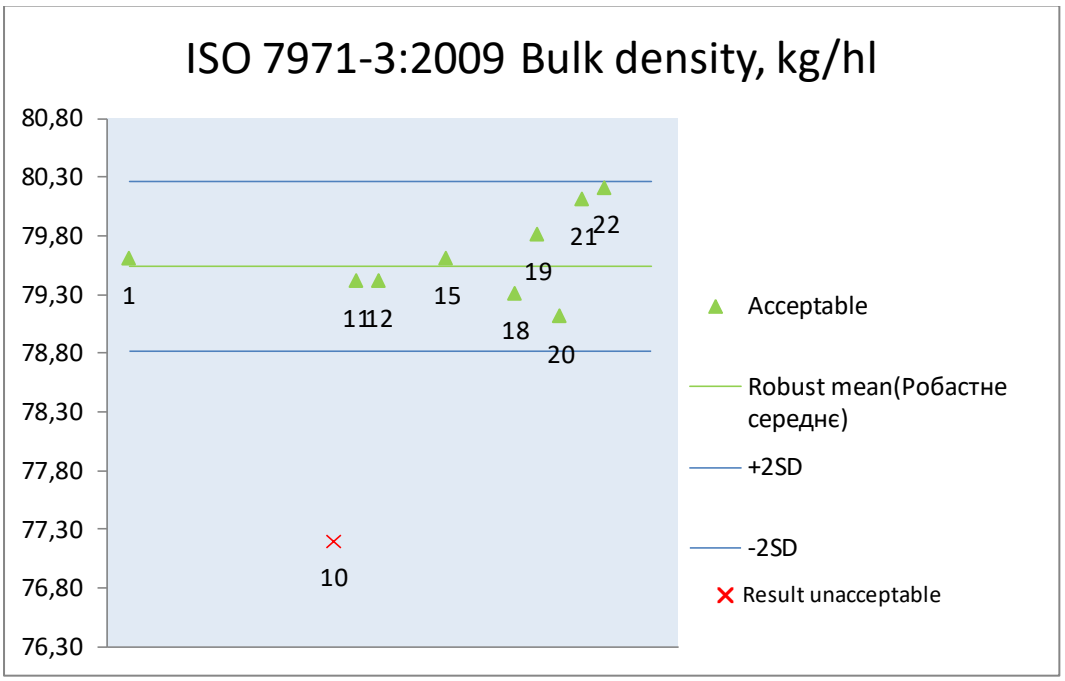
8.10. Express - infrared spectroscopy method, calibrated to ISO 712 Moisture content, %



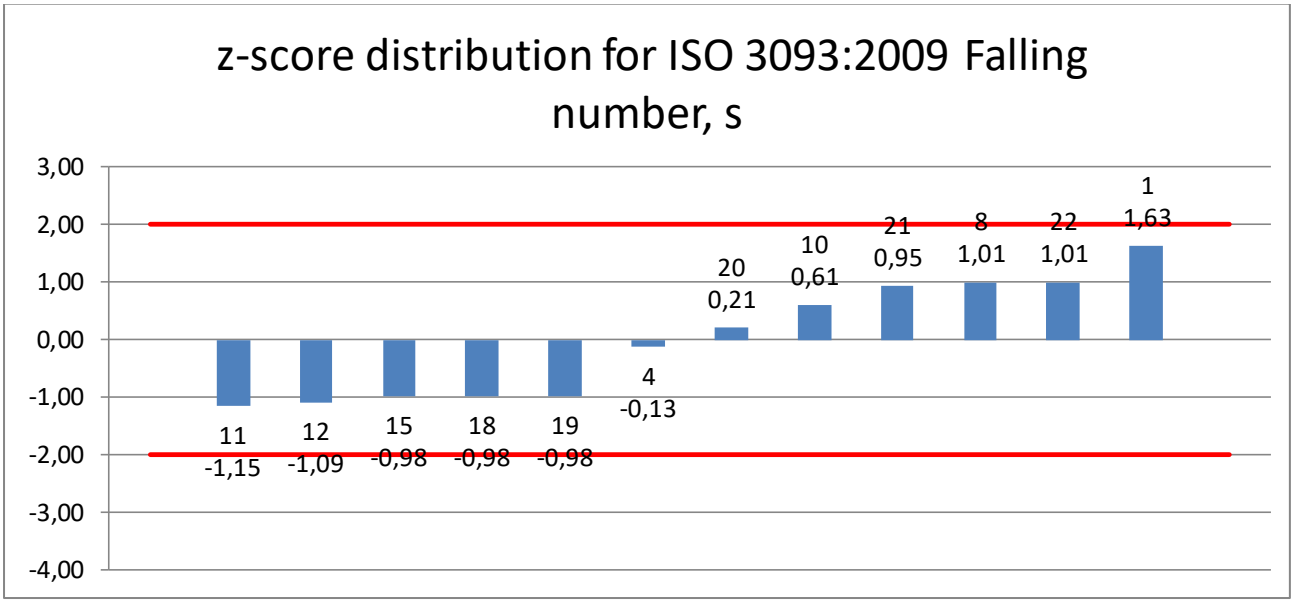


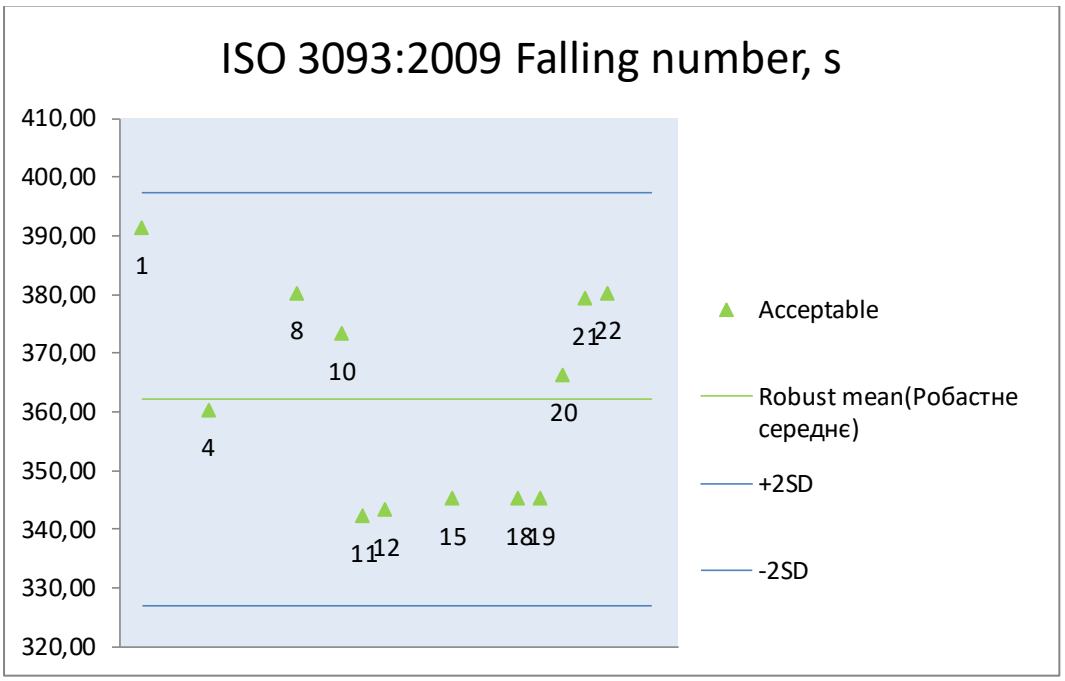
8.11. ISO 7971-3:2009 Bulk density, kg/hl



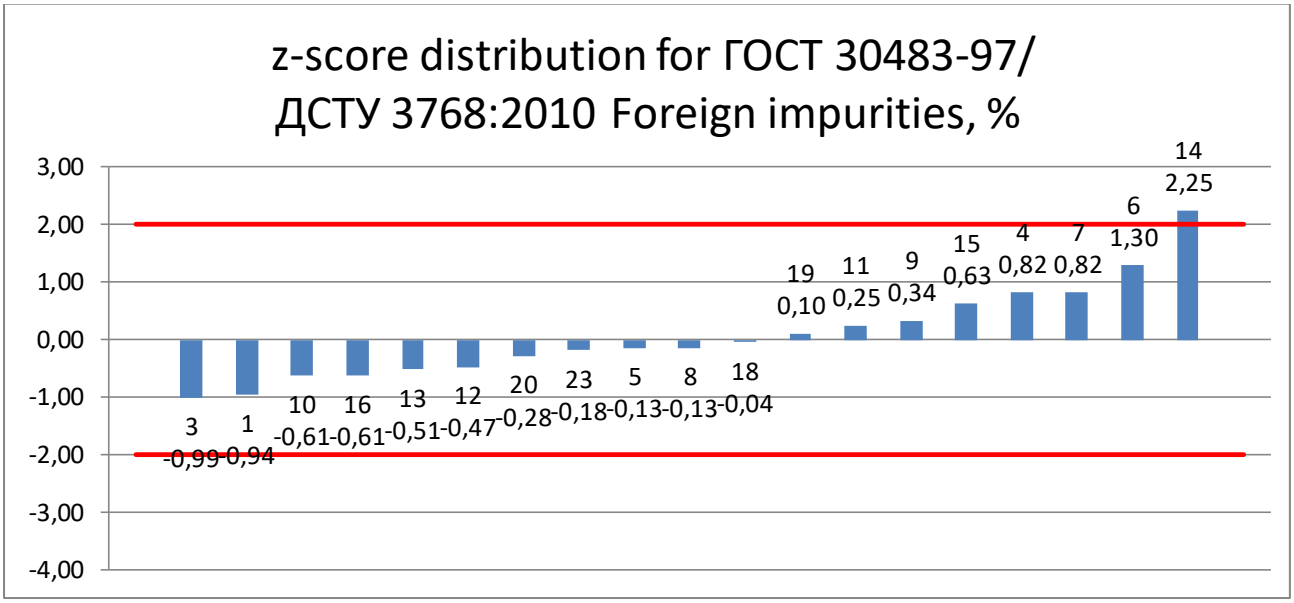


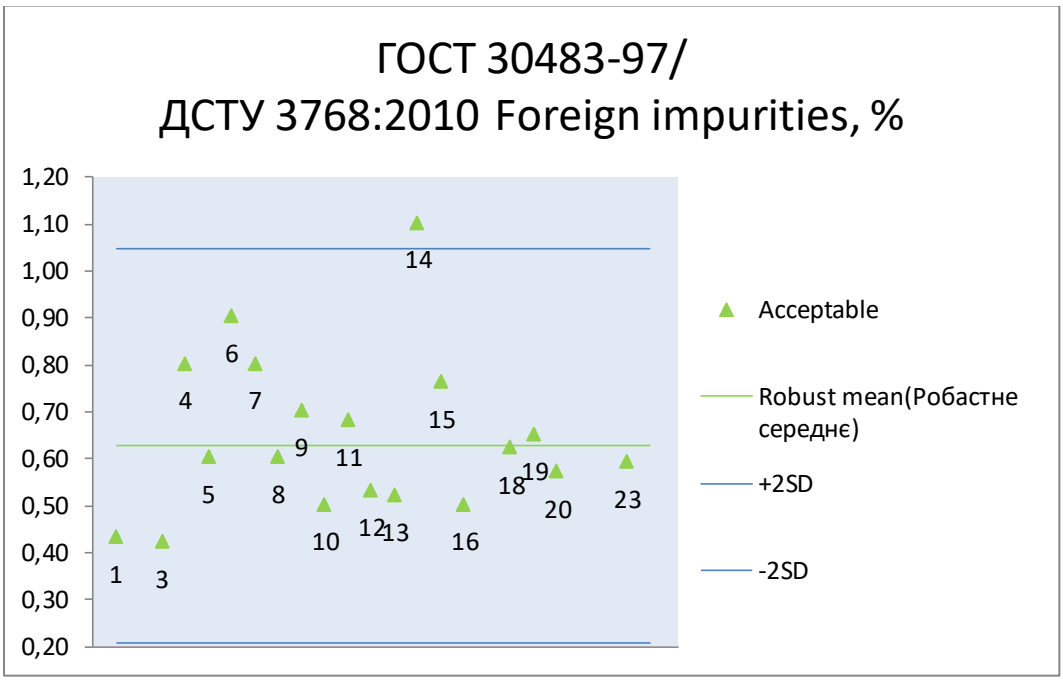
8.12. ISO 3093:2009 Falling number, s



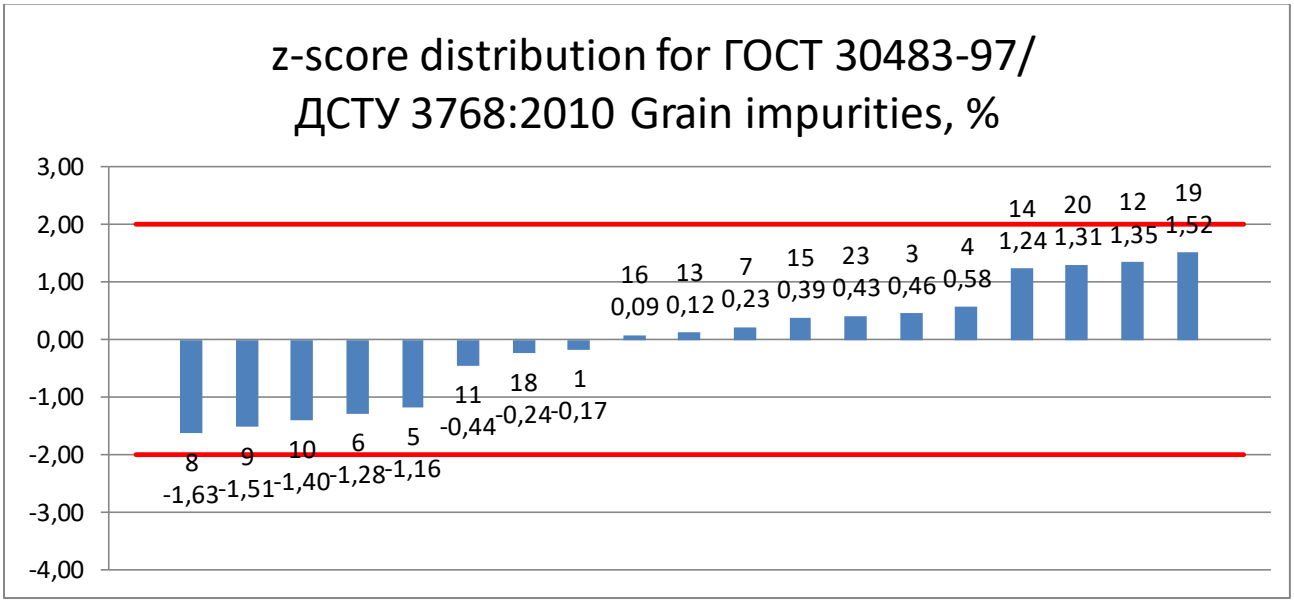


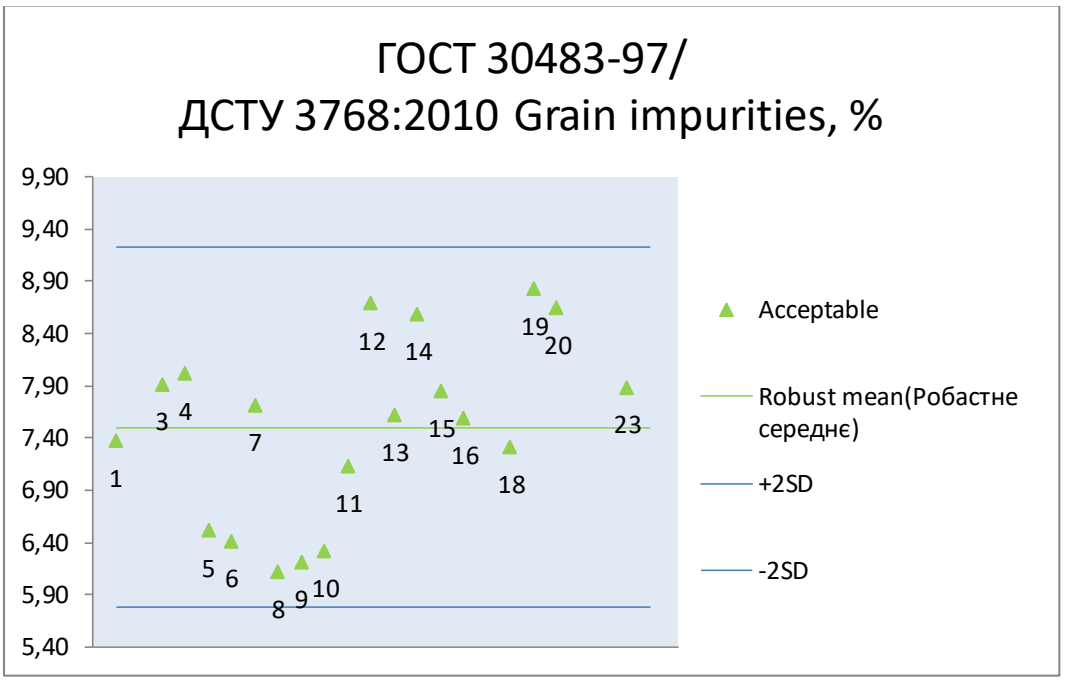
8.13. ГОСТ 30483-97/ДСТУ 3768:2010 Foreign impurities, %



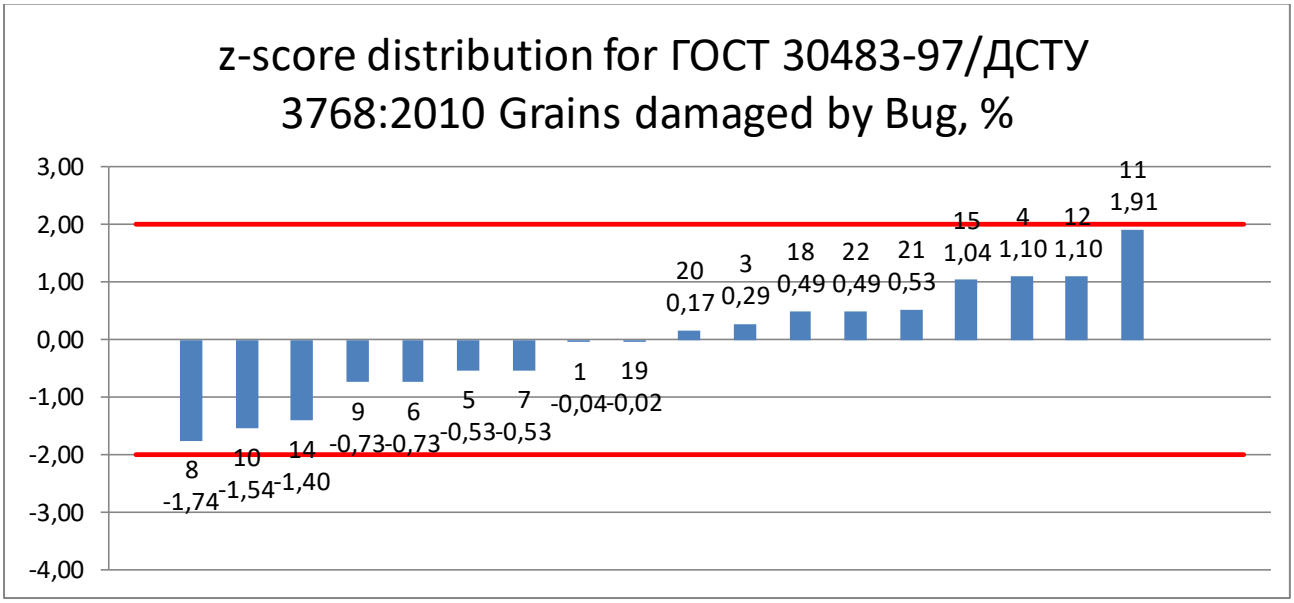


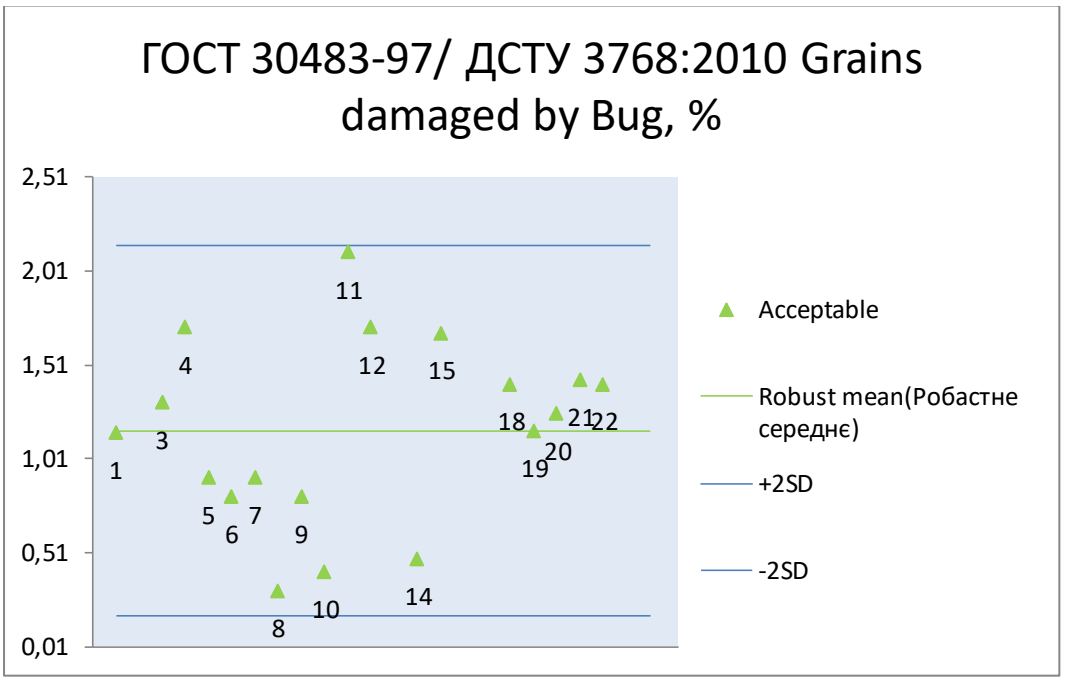
8.14. ГОСТ 30483-97/ДСТУ 3768:2010 Grain impurities, %



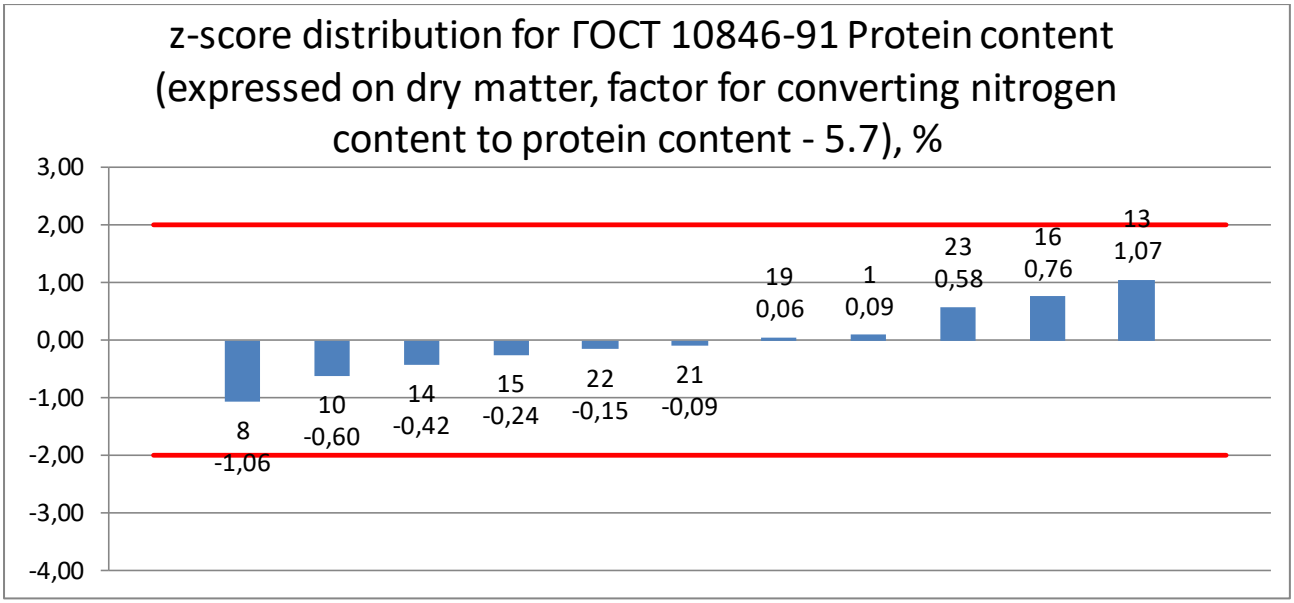


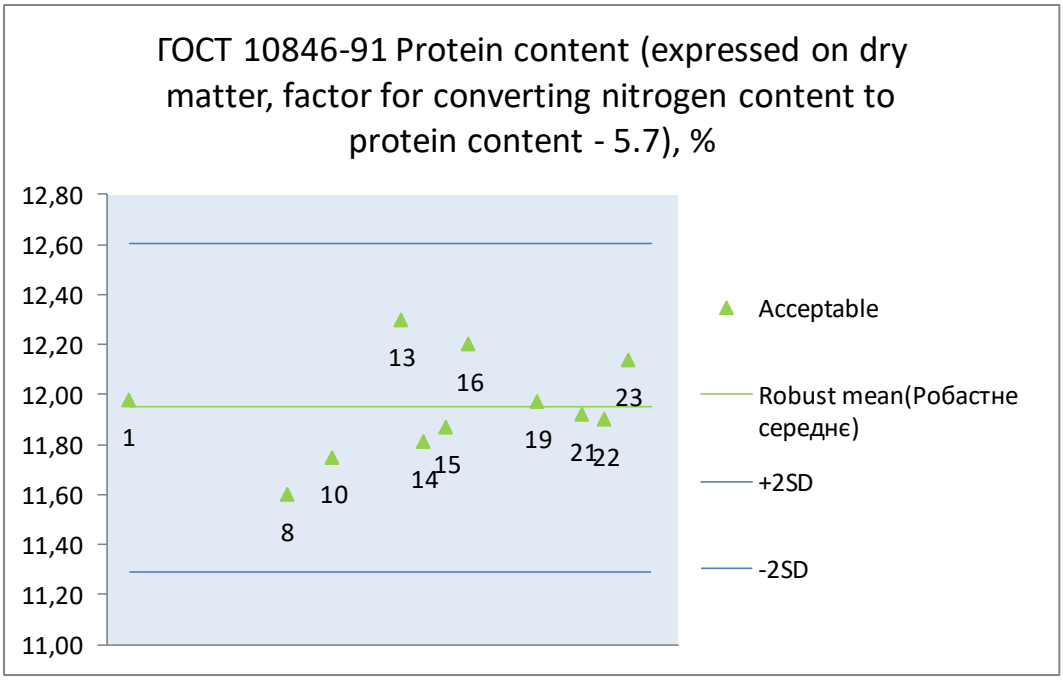
8.15. ГОСТ 30483-97/ДСТУ 3768:2010 Grains damaged by Bug, %



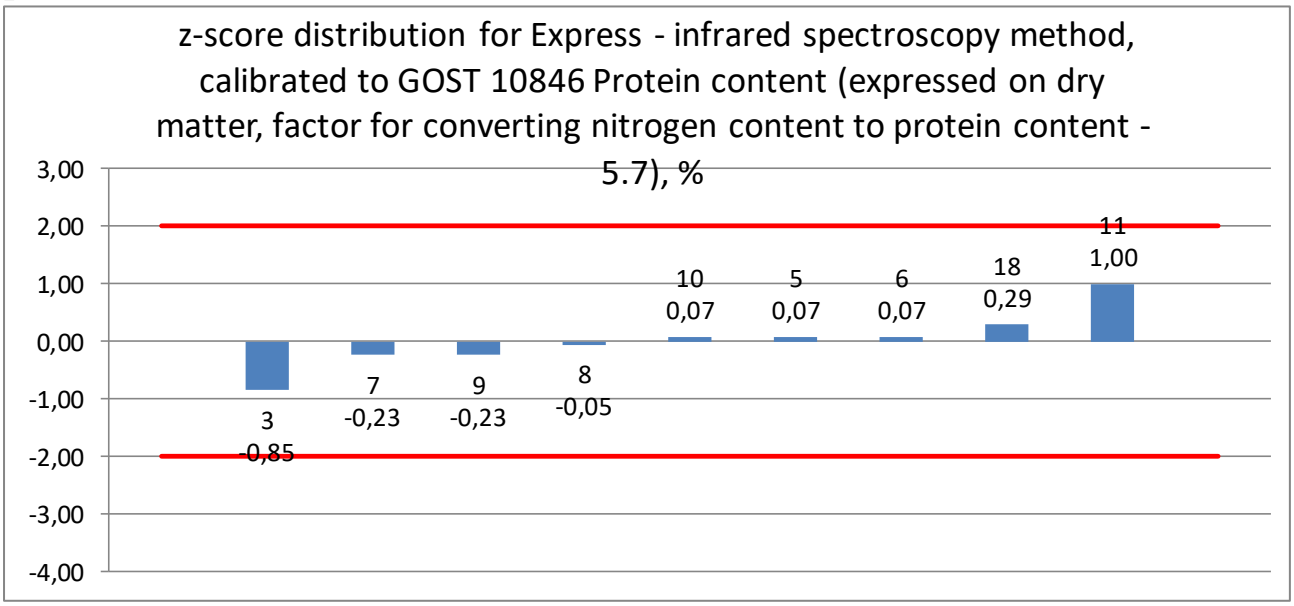


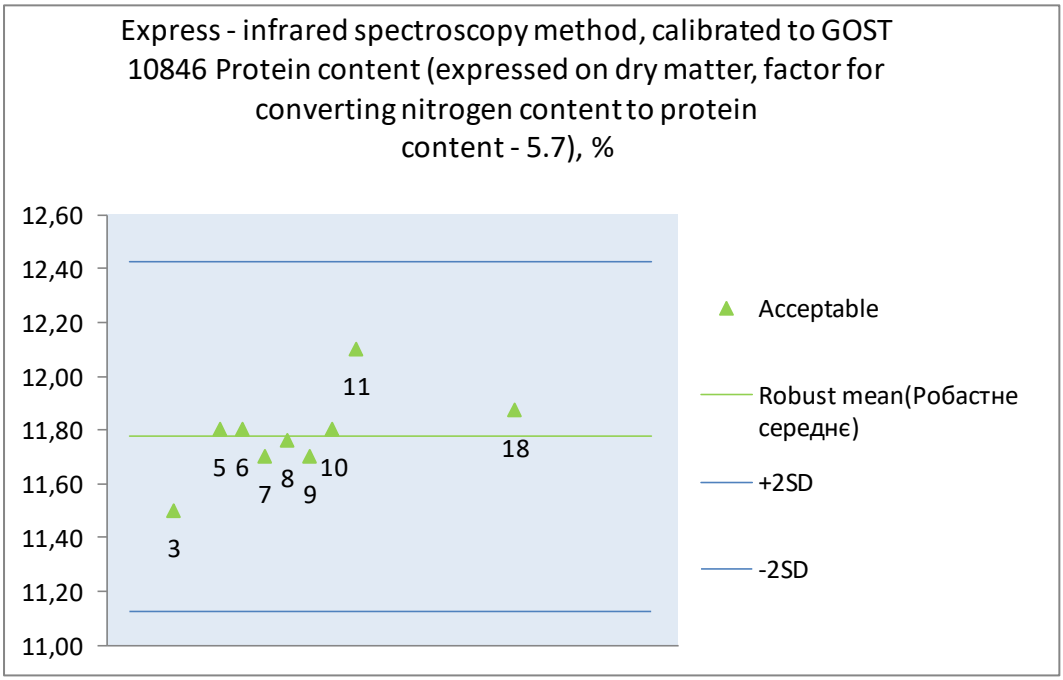
8.16. ГОСТ 10846-91 Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %



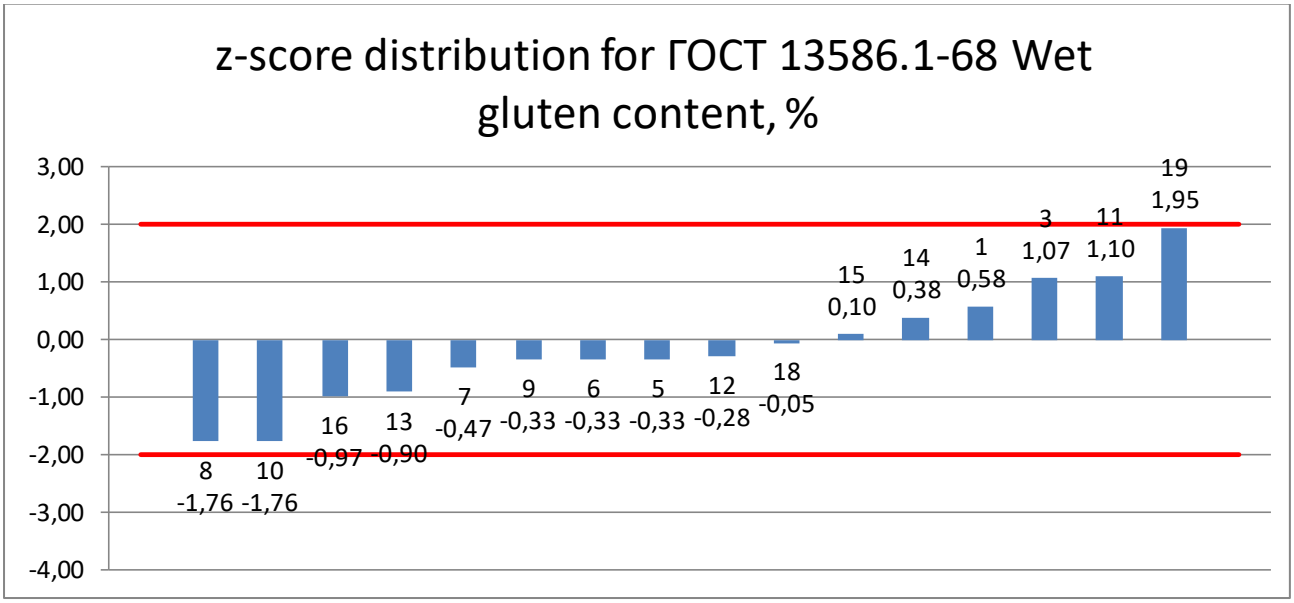


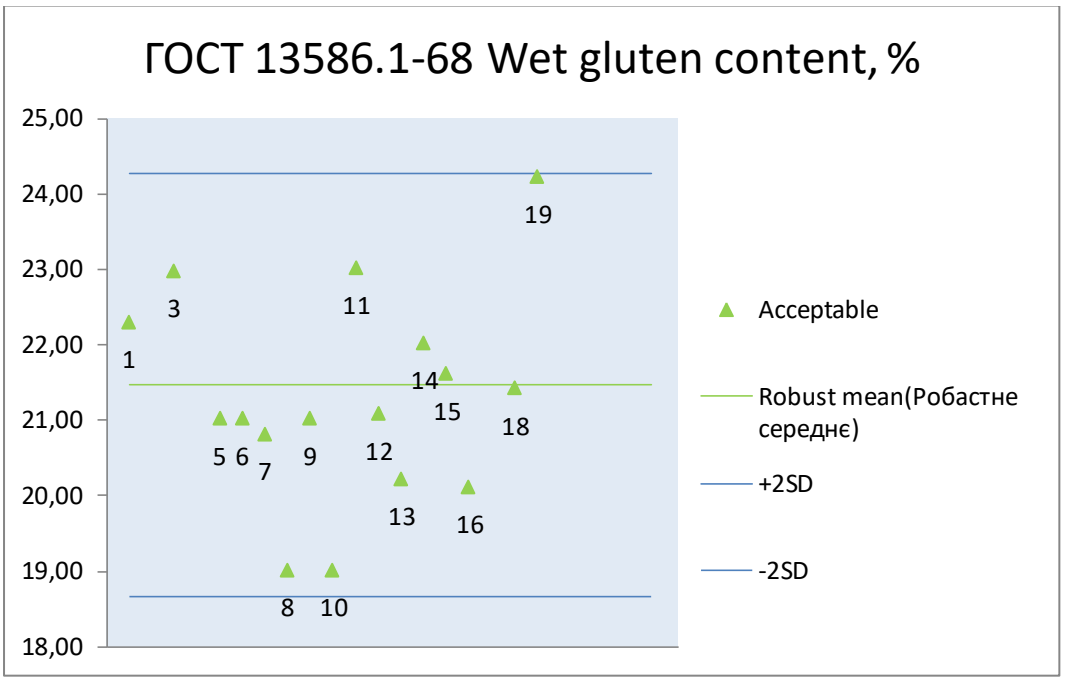
8.17. Express - infrared spectroscopy method, calibrated to GOST 10846 Protein content (expressed on dry matter, factor for converting nitrogen content to protein content - 5.7), %



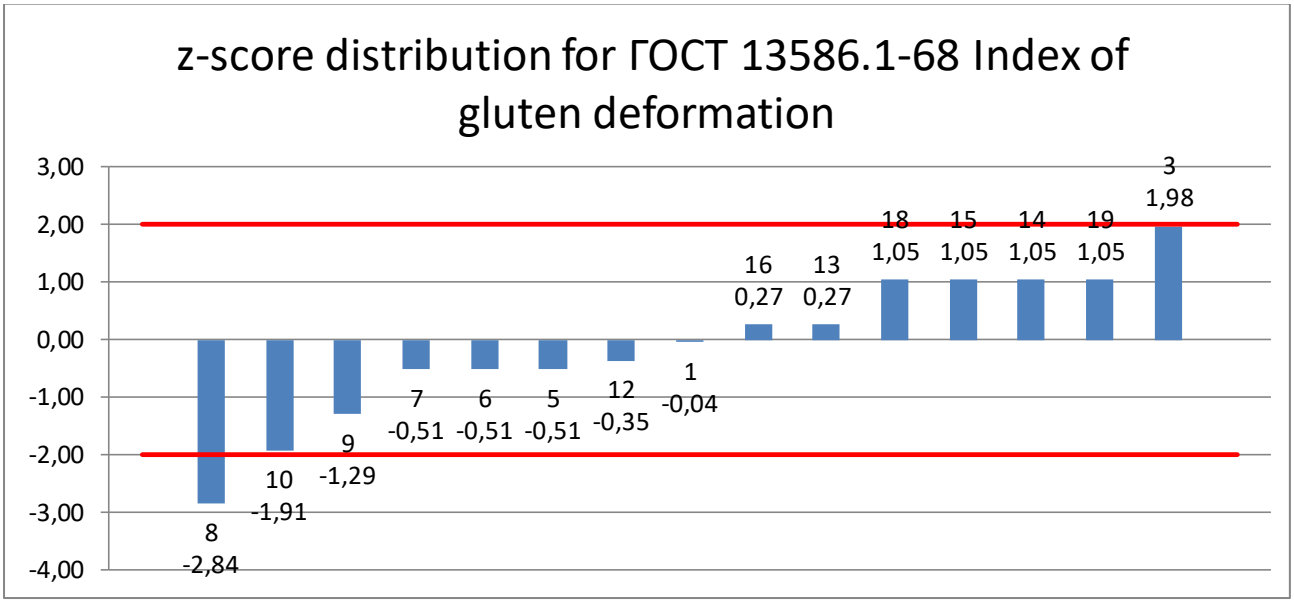


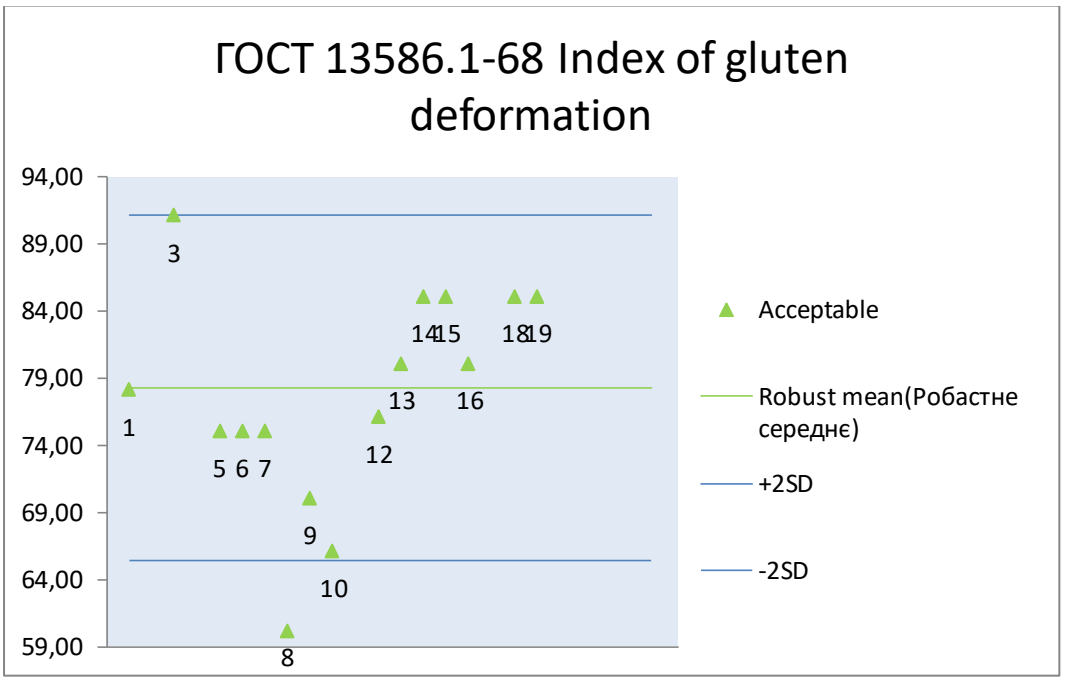
8.18. ГОСТ 13586.1-68 Wet gluten content, %



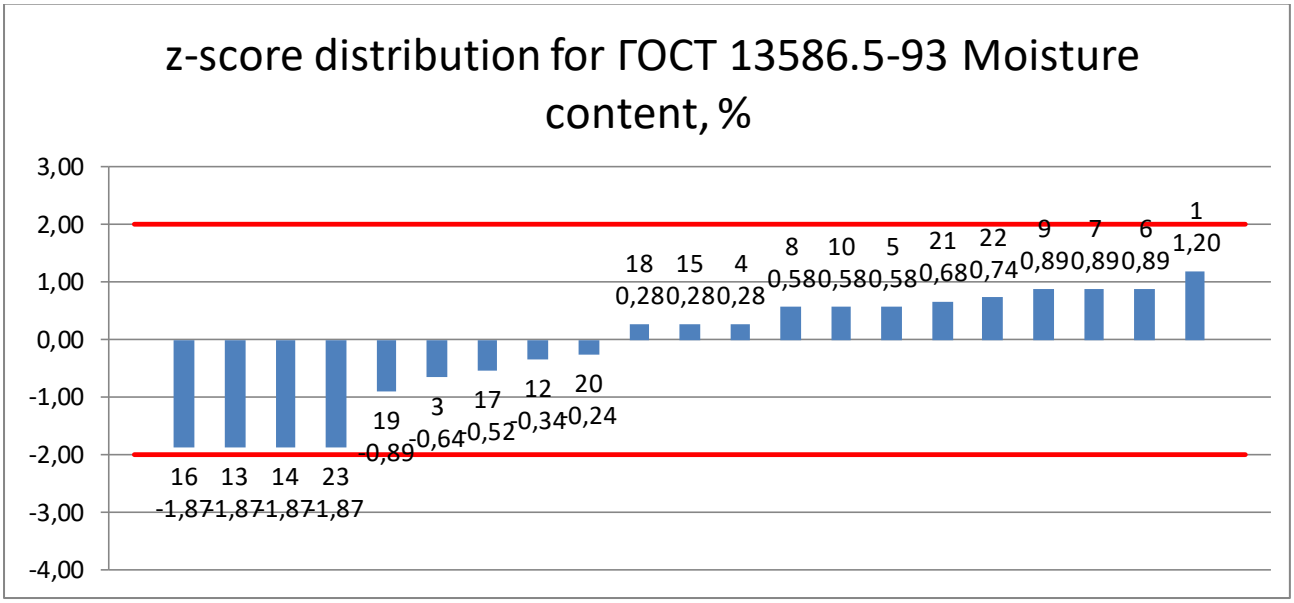


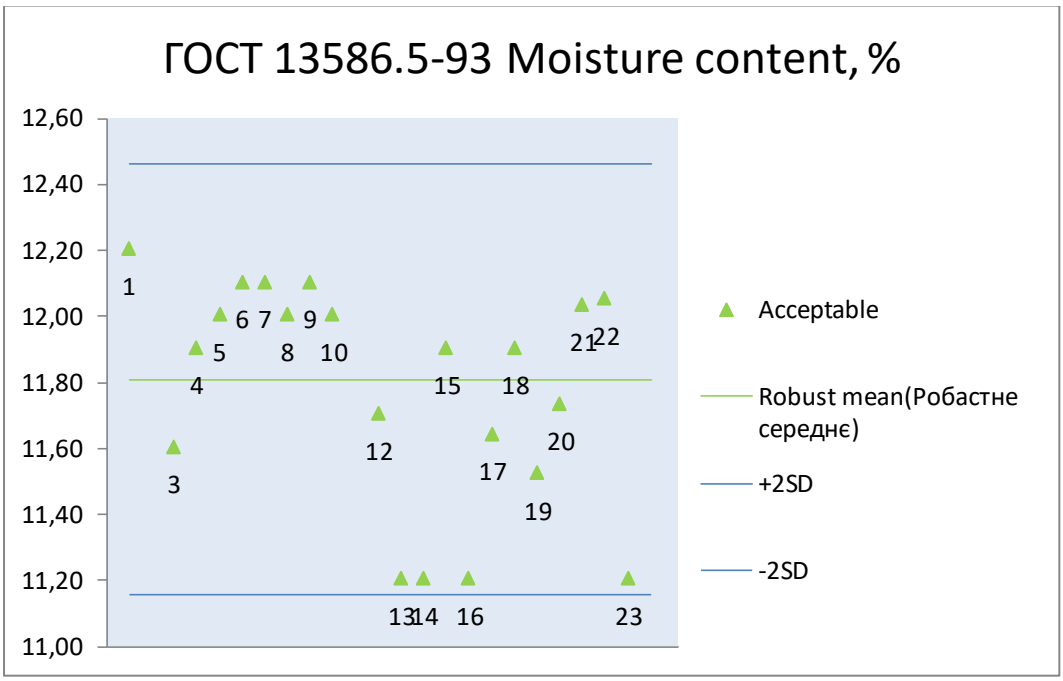
8.19. ГОСТ 13586.1-68 Index of gluten deformation



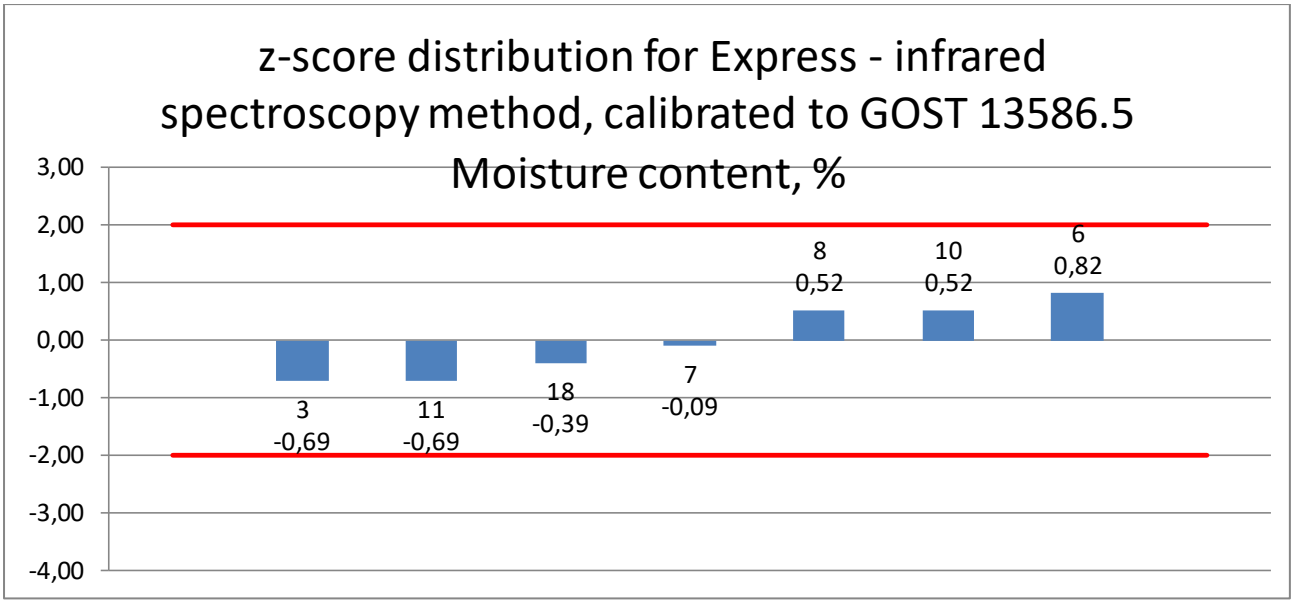


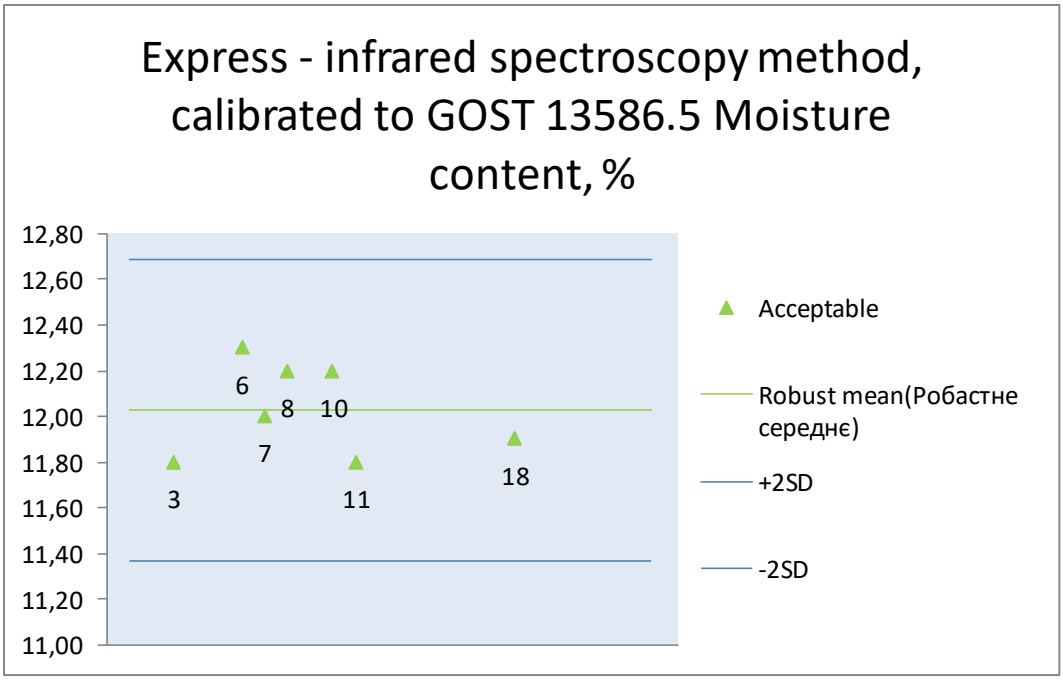
8.20. ГОСТ 13586.5-93 Moisture content, %



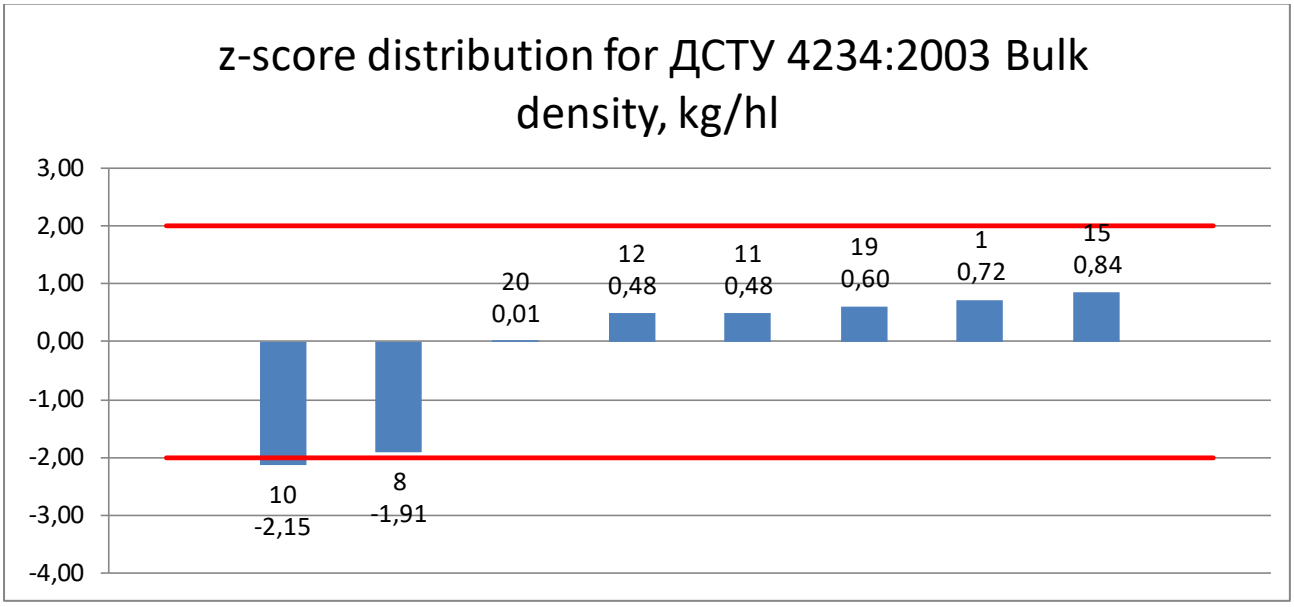


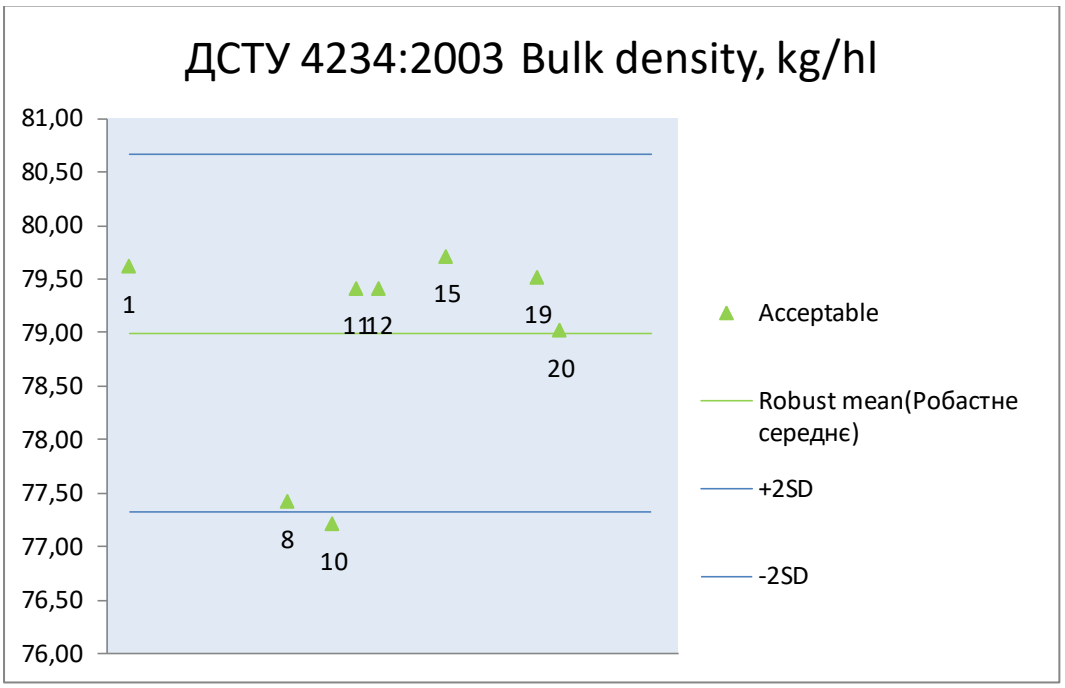
8.21. Express - infrared spectroscopy method, calibrated to GOST 13586.5 Moisture content, %



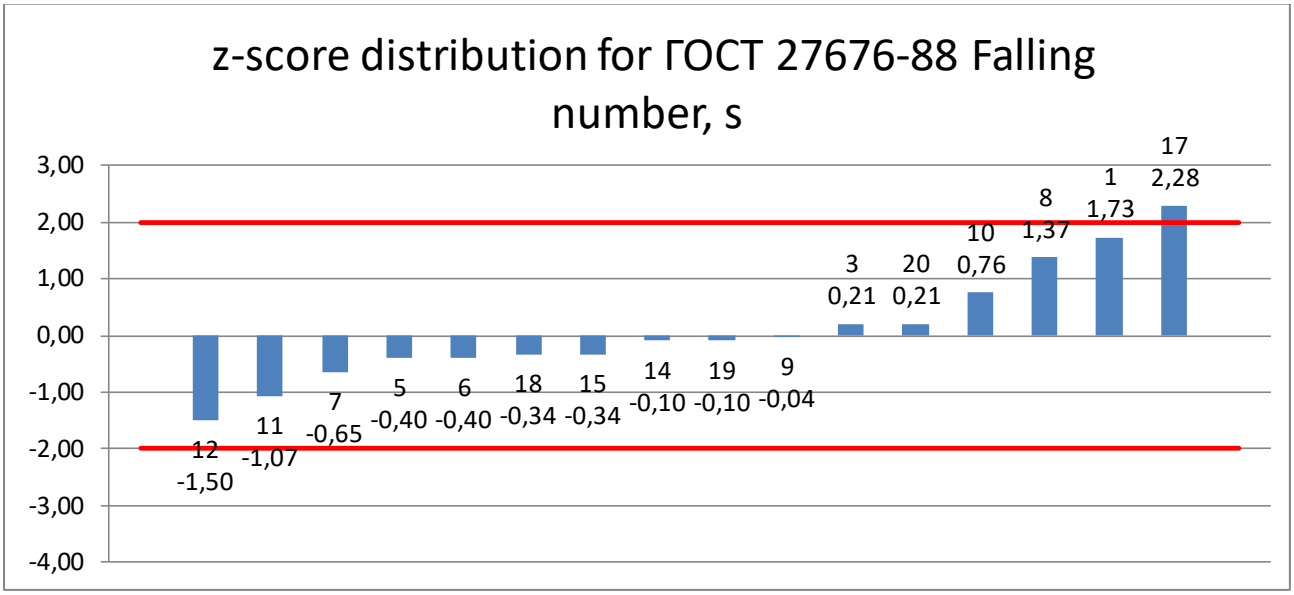


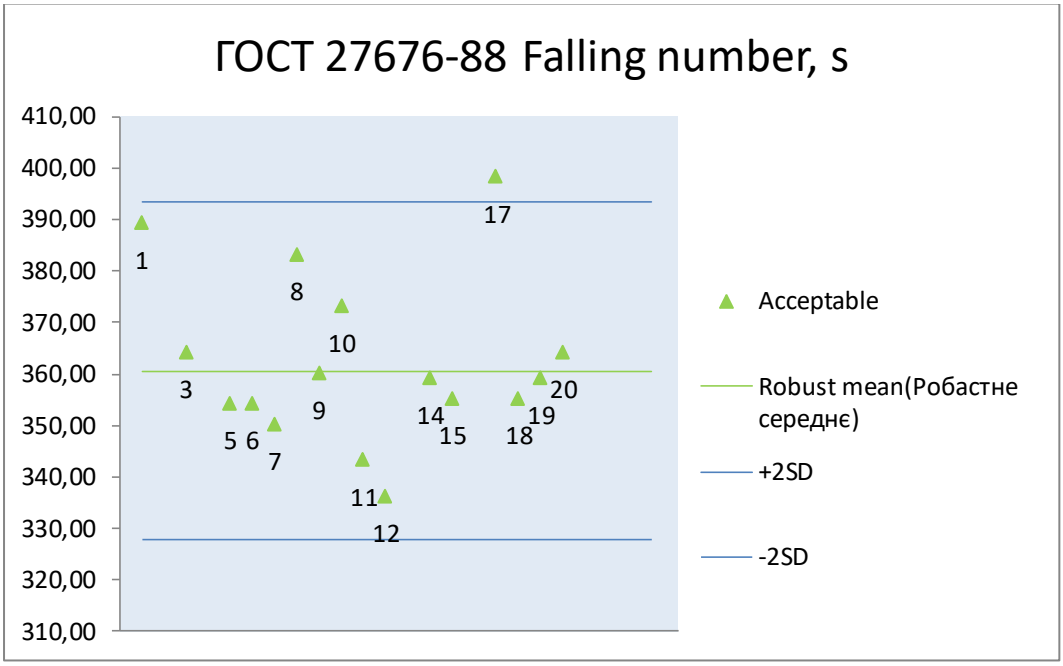
8.22. ДСТУ 4234:2003 Bulk density, kg/hl



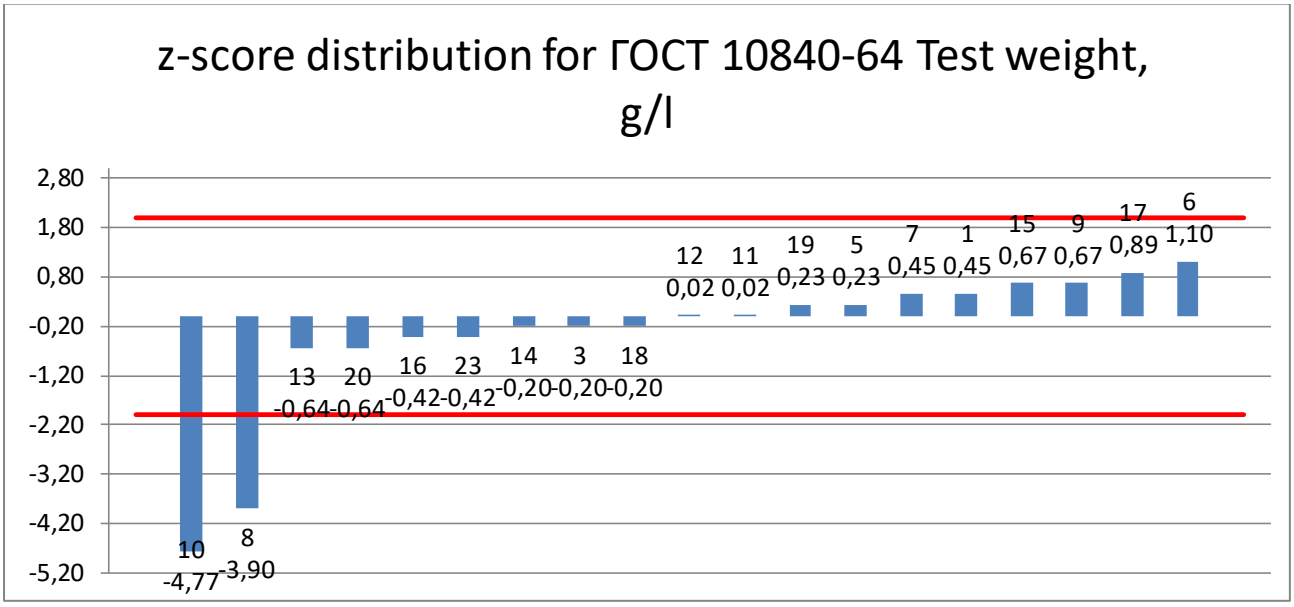


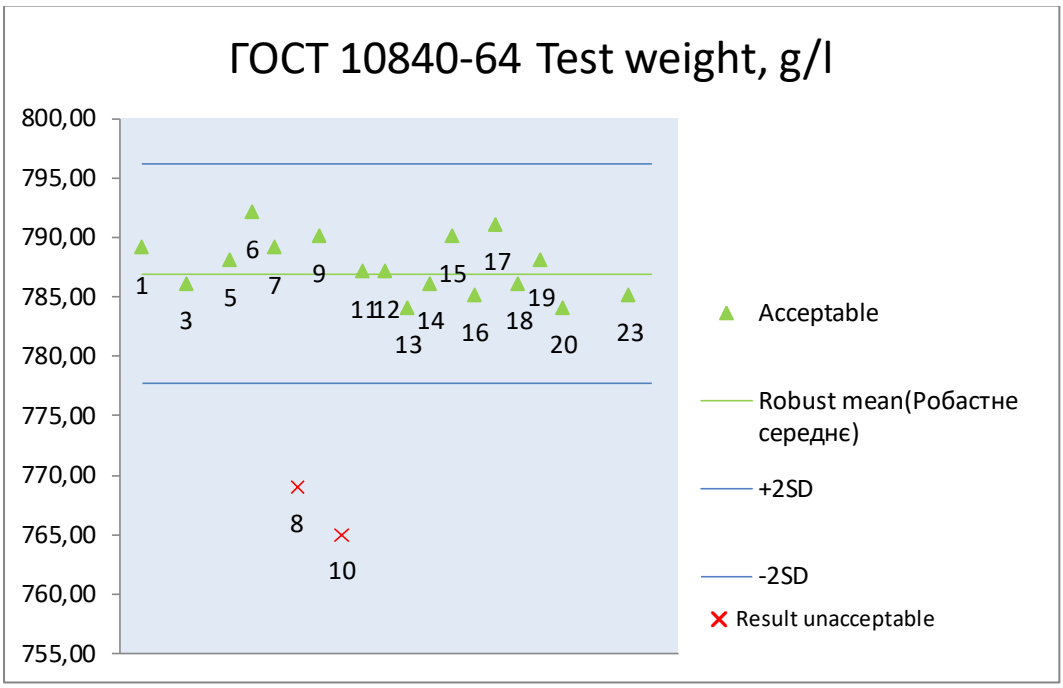
8.23. ГОСТ 27676-88 Falling number, s





8.24. ГОСТ 10840-64 Test weight, g/l





9. NORMATIVE REFERENCE

1. ISO/IEC 17043:2010 Conformity assessment -- General requirements for proficiency testing
2. Analytical Methods Committee, Robust Statistics – How not to reject outliers Part 1. Basic Concepts, Analyst, 1989, 114, 1693-1697
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