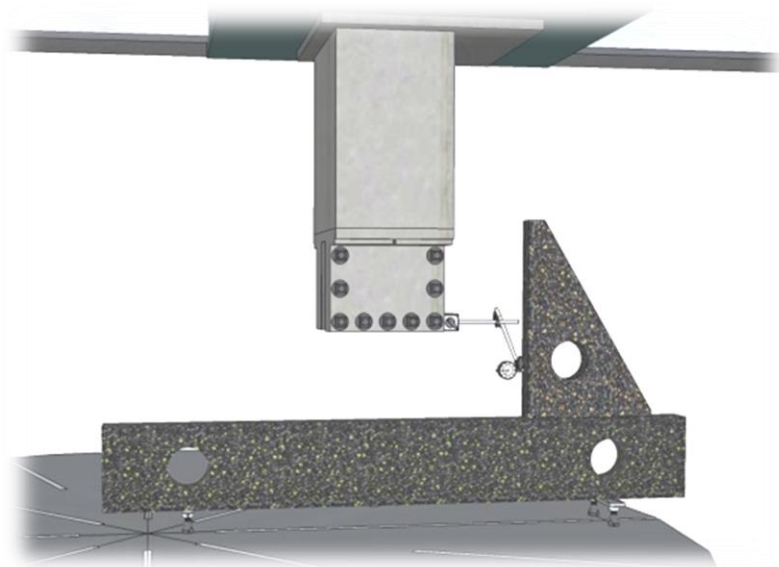




Geometrical tests of machine



Geometrical and practical tests for single and double columns
vertical boring and turning mills with fixed or movable column



Machine

Machine type (single/double column)	:	Double column
Producer	:	SCHIESS
Year of production	:	1988
Type	:	SCHIESS 40 DZ 12-350
Product number	:	

Customer

Company	:	
Responsible person	:	

Test information

Quality controller	:	
Date	:	



Geometrical tests of machine



Basic positions of the parts of the machine for test execution:

Single column vertical lathe

1. The column should be set as near as possible to the axis of rotation of the table, column clamped.
2. Movable cross rail should be fixed at a level 0,3 to 0,5 of max height between the cross rail and the table, cross rail clamped.
3. The railhead should be set as near as possible to the column and the ram in.
4. The side head should be in the lowest position and the side head ram in.

Double column vertical lathe

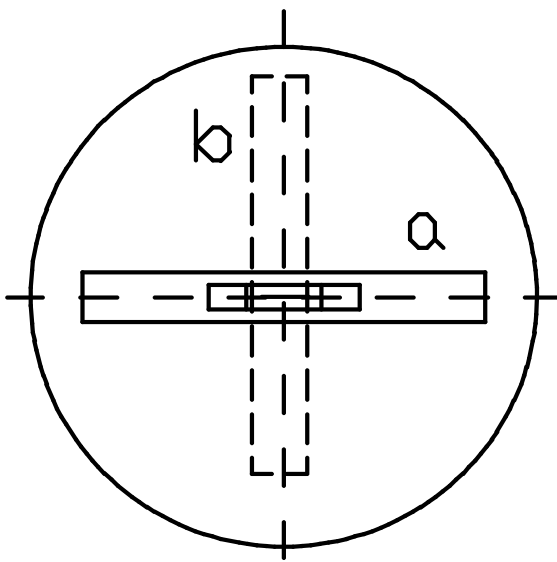
1. Movable cross rail should be fixed at a level 0,3 to 0,5 of max height between the cross rail and the table, cross rail clamped.
2. The right and the left railheads should be as near as possible to the column and the railhead rams in.
3. The side head should be in the lowest position and the side head ram in.

Measuring conditions:

- 1) During measurement of geometric and working accuracy of the machine it is permitted to change order of the tests. The mentioned order of measurements is not obligatory for checking.
- 2) When measuring geometric accuracy, there are followed acceptance terms for vertical lathes in accordance with ČSN ISO 3655 standard, which states the tests of geometric and working accuracy of the singles assemblies and attachments together with appropriate upper deviations. During processing of the works standard, the German standard DIN 8609 was
- 3) The standard testing procedures of geometrical accuracy of vertical lathes are in accordance with ISO 230-1 standard. It is possible to use other procedures giving same or more accurate test results, agreed by the customer.
- 4) In the case of larger machines or where physical constraints on the number position or type of measurements exist, averaging of the results is permitted providing that the deviations are less than 0,01 mm, rounded off to 0,005 mm
- 5) If the requirements for geometrical and practical tests are more exacting than this standard provides or if greater precision is required concerning the maximum and minimum deviations, this must be negotiated and arranged with the producer in advance.
- 6) During the tests, the ambient temperatures should not drop below or exceed the following
Ambient temperature: +17°C až +27°C
Allowed temperature changes: 5°C in 12 hours
2°C in 5 meters

During the tests the machine has to be protected against inadequate dustiness, air flow, heat radiation and other heat sources.

- 7) The standard ČSN ISO 841 - Technical terms of axes and movements - has to be respected
When measuring geometric accuracy, the used measuring devices have to guarantee
- 8) sufficient accuracy for deviations measuring. The gauges have to be credibly calibrated and stabilized to the environment temperature.

<u>Number:</u>	1		
<u>Object:</u>	Table Levelling of the table surface		
<u>Test:</u> The straightedge should be placed across the centre of the table on the supports symmetrically with the axis of the table. The precision level should be placed on the straightedge. The checking should be carried out a) in a plane parallel to the crossrail b) in a plane perpendicular to the crossrail		<u>Diagram</u> 	
<u>Measuring instruments:</u>	Precision level, Straightedge, Standard measurements		
<u>Permissible deviation (mm)</u>			
Record of the last geom. test (YES / NO)	Maximum	Results	
	In direction: a...0,03/1000 mm b...0,03/1000 mm	0,02 0,02	

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	2	
<u>Object:</u>	Table Measurement of camming of the table surface when rotating	
<u>Test:</u> The dial gauge should be placed on a fixed part of the machine making con-tact through the lapping plate with the table. The dial gauge should be ap-proximately 180° from the position occupied by the tool when the table was machined. The table should be rotating as the measurements are taken. The results can be read from the dial gauge.	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Dial gauge, Lapping plate	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	For table diameter :	
	2500 mm....0,025	.....
	3500 mm....0,03	0,02
	4000 mm....0,03	.....
	5000 mm....0,035	.....
	6300 mm....0,045	.....
	7000 mm....0,045	.....
	8000 mm....0,05	.....

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	3	
<u>Object:</u>	Table Measurement of runout of the external cylindrical surface of the table	
<u>Test:</u> The dial gauge should be placed on a fixed part making contact with the external cylindrical surface of the table. The dial gauge should be approximately 180° from the position occupied by the tool when the table was machined. The table should be rotating as the measurements are taken. The results can be read from the dial gauge.	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Dial gauge	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	For table diameter :	
	2500 mm....0,025	.....
	3500 mm....0,03	0,03
	4000 mm....0,03	.....
	5000 mm....0,035	.....
	6300 mm....0,045	.....
	7000 mm....0,045	.....
	8000 mm....0,05	.....

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	4	
<u>Object:</u>	<u>Column</u> Checking of square-ness of the vertical slideways of the column	
<u>Test:</u> The crossrail, railhead and side head in basic position. The checking should be carried out in positions I, II and III. The column should be clamped before each measurement. The level indicates deviations in planes „a“ and „b“. The maximum changes in gradient a(max) and b(max) can be calculated from these readings. I - basic position (as near as possible to the table) II - middle position III - end position (as far as possible to the table)	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Precision square level	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	Change in gradient:	Position I:
	a...0,04/1000 mm	a b
	b...0,04/1000 mm	Position II:
		a b
		Position III:
		a b
		Change in gradient:
		a(max)..... b(max).....

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	5		
<u>Object:</u>	<u>Crossrail</u> Change in the gradient of the crossrail by its moving along the columns		
<u>Test:</u> The column (in the case of one column machines) and the heads should be locked in position. The level indicates the change in the gradient of the rail in positions I, II and III in planes „a“ and „b“. The maximum changes in gradient a(max) and b(max) can be calculated from these readings. I - lower position II - basic position (0,3 ÷ 0,5 Hmax) III - upper position		<u>Diagram</u> 	
<u>Measuring instruments:</u>	Precision square level		
<u>Permissible deviation (mm)</u>			
Record of the last geom. test (YES / NO)	Maximum	Results	
	Change in gradient: a...0,04/1000 mm b...0,06/1000 mm	Position I: a b Position II: a b Position III: a b Change in gradient: a(max)..... b(max).....	

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	6a		
<u>Object:</u>	<u>Right railhead - double column machine</u> Checking of parallelism of the movement of the railhead to the table surface		
<u>Test:</u>	<u>Diagram</u>		
Crossrail, railheads and side head in basic position. Checking should be made by applying the dial gauge stylus on the straightedge laid parallel to the table surface or to horizontal plane (by large machines where is not possible to place the straightedge symmetrically across the middle of table). The railhead, with the dial gauge applied to the ram, should be moved slowly and readings taken from the dial gauge.			
<u>Measuring instruments:</u>	Dial gauge, Straightedge, Precision instruments, Precision square level		
<u>Permissible deviation (mm)</u>			
Record of the last geom. test (YES / NO)	Maximum	Results	
	a) machine without a height-correcting device with working travel of head (mm)		
	1600 mm.....	0,04	.....
	2000 mm.....	0,06	.....
	2500 mm.....	0,07	.....
	3150 mm.....	0,09	.....
	b) machine with a height-correcting device with working travel of head (mm)		
	1500 mm	0,03	0,03
	2000 mm	0,04	.....
	2500 mm.....	0,05	.....
	3150 mm.....	0,06	.....

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	7	
<u>Object:</u>	<u>Right railhead</u> Checking of squareness of the ram to the table surface	
<u>Test:</u> The column (in the case of single column machines), crossrail, railhead (which is not being measured) and side head in basic position. The straightedge is placed parallel to the table surface or to horizontal plane (by large machines where is not possible to place the straightedge symmetrically across the middle of table). The square is placed on the straightedge. The dial gauge is fixed on the ram. Ram is slowly moved and readings can be taken. Measurements are taken at 600 mm travel in a plane: a) parallel b) perpendicular to the crossrail.	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Dial gauge, Straightedge, Square, Standard measurements, Precision square level	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	In direction: a...0,01/400 mm b...0,015/400 mm	0,01 0,02

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	8		
<u>Object:</u>	<u>Left railhead - double column machine</u>		
		Checking of parallelism of the movement of the railhead to the table surface	
<u>Test:</u> Crossrail, railheads and side head in basic position. Checking should be made by applying the dial gauge stylus on the straightedge laid parallel to the table surface or to horizontal plane (by large machines where is not possible to place the straightedge symmetrically across the middle of table). The railhead, with the dial gauge applied to the ram, should be moved slowly and readings taken from the dial gauge.	<u>Diagram</u>		
<u>Measuring instruments:</u>	Dial gauge, Straightedge, Precision instruments, Precision square level		
<u>Permissible deviation (mm)</u>			
Record of the last geom. test (YES / NO)	Maximum	Results	
	a) machine without a height-correcting device with working travel of head (mm)		
	1600 mm..... 0,04	.....	
	2000 mm..... 0,06	.....	
	2500 mm..... 0,07	.....	
	3150 mm..... 0,09	.....	
	b) machine with a height-correcting device with working travel of head (mm)		
	1500 mm 0,03	0,04	
	2000 mm 0,04	.....	
	2500 mm..... 0,05	.....	
	3150 mm..... 0,06	.....	

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	9	
<u>Object:</u>	<u>Left railhead</u> Checking of squareness of the ram to the table surface	
<u>Test:</u> Crossrail, railhead (which is not being measured) and side head in basic position. The straightedge is placed parallel to the table surface or to horizontal plane (by large machines where is not possible to place the straightedge symmetrically across the middle of table). The square is placed on the straightedge. The dial gauge is fixed on the ram. Ram is slowly moved and readings can be taken. Measurements are taken at 600 mm travel in a plane: a) parallel perpendicular the crossrail.	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Dial gauge, Straightedge, Square, Standard measurements, Precision square level	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	In direction: a...0,01/400 mm b...0,015/400 mm	0,01 0,03

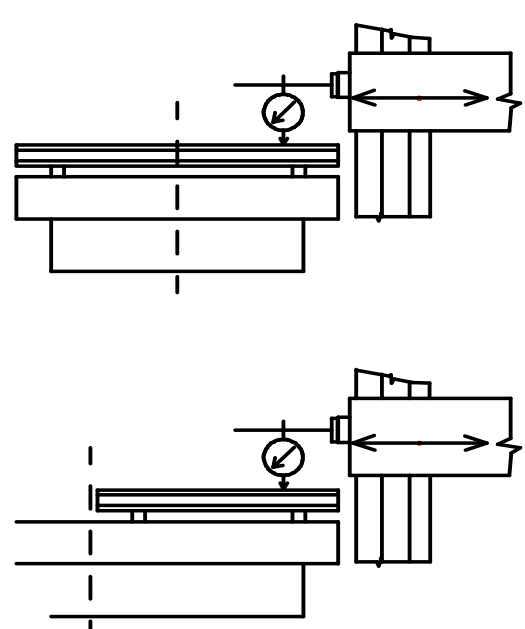
Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u>	10	
<u>Object:</u>	Side head Checking of parallelism of the side head ram movement to the table surface	
<u>Test:</u> The column (in the case of single column machines), crossrail and railheads in basic position. The straightedge is placed parallel to the table surface or to horizontal plane (by large machines where is not possible to place the straightedge symmetrically across the middle of table). The dial gauge is fixed on the side head ram. The side head ram is moved and readings can be taken. Permitted maximum and minimum deviations are acceptable to the half of the stroke ram.	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Dial gauge, Straightedge, Precision instruments, Precision square level	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	0,02/300 mm Measurement are taken from in position to the half of the stroke ram	

Measured by:

Date:

Signature:

Geometrical tests of machine



<u>Number:</u> 11		
<u>Object:</u>	Side head Checking of squareness of the side head movement to the table surface	
<u>Test:</u> The column (in the case of single column machines), rail and railheads clamped in basic position. The straightedge is placed parallel to the table surface or to horizontal plane (by large machines where is not possible to place the straightedge symmetrically across the middle of table). The square is placed on the straightedge. The dial gauge is fixed on the side head ram. The side head ram is slowly moved and readings can be taken. Measurements are taken at 600 mm travel.	<u>Diagram</u> 	
<u>Measuring instruments:</u>	Dial gauge, Straightedge, Square, Standard measurements, Precision square level	
<u>Permissible deviation (mm)</u>		
Record of the last geom. test (YES / NO)	Maximum	Results
	0,01/300 mm	

Measured by:

Date:

Signature: