# Advanced Manufacturing Technician Exam Preparation Documents

# Part 1

# 2023

Test Taker first and last name:

Test Taker number:

Test Taker company:



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# Final Examination Overview – ICATT Advanced Manufacturing Technician

## Final examination: Part 1
**Weighting: 40 %**

Areas of examination

### Practical task with technical, situation-based discussions

Weighting: 50 %

Total time permitted: 7 h

**– Planning***
Permitted Conversion time: 30 min

**– Execution**
Weighting **including technical discussion**: 85 %
Time allotted: 6.5 h

**– Inspection**
Weighting: 10 %
Time allotted: 30 min Included in execution

**Professional, situation-based discussions**

Weighting: 5 %
Time permitted: 10 min
– The duration of the discussions is included in the examination time.
– The discussions can last up to 10 min within the scope of the examination and can be held continuously or in stages.

*30 min of conversion time is allowed for Part 1 apprentices before the start of the practical exam. No work may begin during this time. Conversion and planning only.

### Written examination

Weighting: 50 %

Time permitted: 1 h 30 min

**– Part A (50%):**
23 multiple choice questions
3 of which can be deselected
6 of which cannot be deselected

**– Part B (50%):**
8 short answer questions
No deselection possible

## Final examination: Part 2
**Weighting: 60 %**

Areas of examination

### Practical task with technical, situation-based discussions

Weighting: 50 %

Total time: 14 h

**– Preparation for the practical task Phase 1**
Time allotted: 8 h in company

**– Planning***
Time allotted: 20% 30 min

**– Execution of the practical task Phase 2 with inspection**
Time allotted: 40 % 5.5 h at exam site

Including weighting: **observations and technical discussions**
Time allotted: 40 % 20 min included in execution

The practical task is assessed by means of:
– product
– Inspection
– technical discussions
– Observations by the board of examiners

*The planning phase takes place after the written assignments or before the practical exam. If the planning time of 30 min is exceeded or not used in full, the relevant deviation is compensated for in the execution and review phases to ensure that the total permitted time for the exam does not exceeded 6 h.

### Written examination

– Production Technology
– Task and Functional analysis
– OSHA and Workers Rights

Weighting: 50 %

Total time permitted: 4 h 15 min

**– Production Technology**

Time permitted: 105 min
Weighting: 40 %

**Part A (50%):**
28 multiple choice questions – 3 of which can be deselected
8 of which cannot be deselected

**Part B (50%):**
8 short answer questions
No deselection possible

**– Task and Functional analysis**

Time permitted: 105 min
Weighting: 40 %

**Part A (50%):**
28 multiple choice questions
3 of which can be deselected
8 of which cannot be deselected

**Part B (50%):**
8 short answer questions
No deselection possible

**– OSHA and Workers Rights**

Time permitted: 45 min
Weighting: 20 %

20 multiple choice questions
5 of which can be deselected

4 short answer questions
1 of which can be deselected

# AHK-USA CHICAGO

Final Examination Part 1 – Summer 2023

| **Standard Preparation List for the Apprenticeship Training Company** | **Advanced Manufacturing Technician** |
|---|---|

Instead of the items listed, alternatively comparable customary tools, measuring and auxiliary equipment can be used.

## I Quality measuring equipment that must be provided by the training company for each test taker to prepare for the exam:

| | | | |
|---|---|---|---|
| 1. | 1 Caliper | min. 135 mm | DIN 862 |
| 2. | 1 Micrometer | 0-25 mm | |
| 3. | 1 Try square | 100 x 70 mm | |
| 4. | 1 Beveled steel square | 75 x 50 mm | |
| 5. | 1 Steel rule | 300 mm | |
| 6. | 1 Vernier depth gauge | min. 135 mm | DIN 862 |
| 7. | 1 Slide gauge/ caliper | 250 mm | DIN 862 |
| 8. | 1 Set of radius gauges | 1-7 7.5-15 (concave and convex) | |
| 9. | 1 Universal protractor | | |

## II Tools that must be provided by the training company for each test taker:

| | | | |
|---|---|---|---|
| 1. | 1 Marking tool | | |
| 2. | 1 Center punch | | |
| 3. | 1 Fitter's hammer | 300 g | DIN 1041 |
| 4. | 1 Rubber or plastic hammer | | |
| 5. | 1 Divider caliper | 150 mm shank length | |
| 6. | 1 Manual hack saw for metal | 300 mm | DIN 6473 |
| 7. | 1 Flat file | 150-1 150-3 250-1 250-3 | DIN 7261 |
| 8. | 1 Triangular file | 150-1 150-3 | DIN 7261 |
| 9. | 1 Round file | 150-1 150-3 | DIN 7261 |
| 10. | 1 Square file | 150-1 150-3 | DIN 7261 |
| 11. | 1 Half-round file | 150-1 150-3 | DIN 7261 |
| 12. | 1 File brush | | |
| 13. | 1 Three-square scraper or manual deburrer | | |
| 14. | 1 Set pin punches | 3, 4, 5, 6, 8 | DIN 6450 |
| 15. | 1 Set Allen wrenches for screws with hex recess | Wrench size 2 to 10 mm | ISO 2936 |
| 16. | 1 Screwdriver for screws with slot | A1 x 6.5 A1.2 x 8.0 | DIN 5265 |
| 17. | 2 Parallel screw clamps | 100 mm span (or comparable) | |
| 18. | 1 Set of marking punches (Arabic numerals) | | 3 mm |
| 19. | 1 Parting chisel (stripping chisel) | 10 x 2 | |
| 20. | 1 Center drill | A1.6 | DIN 333 |

**III Auxiliary equipment that must be provided by the training company for each test taker:**

1. 1 Chalk
2. 1 Rag
3. 1 Hand brush
4. 1 File cleaner (CuZn sheet)
5. 1 Safety glasses
6. 1 Hair net, or hair pulled back safely so that it does not fall in face or near equipment
7. 1 Mechanical and Metal Trades Handbook (to be provided by test taker)
8. 1 Non-programmable pocket calculator not connected to a network without possibility of communicating with others (to be provided by test taker)
9. 1 Writing implements (to be provided by test taker)

**IV Tools and auxiliary equipment for the set-up of the control technology components that must be provided by the training company for each test taker:**

10. Tool for properly cutting plastic hose to size
11. Tools for proper assembly of plug connections and noise dampers that fit the components provided
12. Tool and/or auxiliary equipment for removing the plastic hose
13. Writing implements for marking adhesive labels
14. 1 Open-end wrench (size 8) and/or appropriate for fastening the components (e.g., for use of screws and nuts M5)
15. 1 Open-end wrench (size 32) and/or appropriate for the cylinder used
16. 1 Open-end wrench appropriate for the size of the piston rod of the cylinder used
17. 1 Open-end wrench appropriate for the nut of the piston rod thread of the cylinder used
18. 1 Metal tape measure

Alternatively, comparable customary tools, measuring and auxiliary equipment can be used.

| **AHK-USA CHICAGO**<br>Final Examination Part 1 – Summer 2023 | |
|---|---|
| **Variable Preparation List for the Apprenticeship Training Company** | **Advanced Manufacturing Technician** |

**Please note: The following tools, testing and auxiliary equipment provided are standardized according to metric standards.**

Instead of the items listed, alternatively comparable customary tools, testing and auxiliary equipment can be used. If there is an ⊗ next to the listed item, this or an equivalent item must be provided by the company for the apprentice to use on exam day. If size is striked through, that size does not need to be provided. Sizes are in metric.

**V. Tools, testing and auxiliary equipment that must be provided for each test taker:**

| | | | | |
|---|---|---|---|---|
| ○ | 1. | 1 Open-end wrenches, sizes | 7 8 10 13 16/17 18/19 | |
| ○ | 2. | 1 Triangular file | 250-1 250-3 | DIN 7261 |
| ○ | 3. | 1 Square file | 250-1 250-3 | DIN 7261 |

**Tools, testing and auxiliary equipment that must be provided for each test taker:**

| | | | | |
|---|---|---|---|---|
| ⊗ | 1. | 1 Twist drill | ∅ 3.0 ~~3.3~~ 3.8 ~~4.0 4.1~~ 4.2 ~~4.5~~ 4.8 5.0 ~~5.1~~<br>∅ 5.5 ~~5.8 6.1~~ 6.5 ~~6.6 6.8 7.0 7.1 7.8 8.0 9.8~~ | |
| ⊗ | 2. | 1 Counterbore | ~~8 x 4.5~~ 10 x 5.5 ~~11 x 6.6 15 x 9~~ | DIN 373 |
| ⊗ | 3. | 1 Countersink 90° | 1-5 5-10 10-20.5 | |
| ⊗ | 4. | 1 Chucking reamer H7 | 5 ~~6 8 10 12 16~~ | DIN 212 |
| ⊗ | 5. | 1 Limit plug gauge H7 | 5 ~~6 8 10 12 16~~ | |
| ○ | 6. | 1 Fitter's hammer | 500 g | |
| ⊗ | 7. | 1 Set tap with tap wrench<br>alternatively machine tap | ~~M4~~ M5 M6 ~~M8~~ | |
| ⊗ | 8. | 1 Screw die with screw die mount ~~M4 M5~~ M6 ~~M8~~ (suitable for lathe) | | |
| ○ | 9. | 1 Machine or set tap (M10 x 1.25) and/or appropriate for the piston rod thread of the cylinder provided and twist drill for drilling the tap hole | | |

**Plan to bring all tools listed to the exam for use during the examination. The Exam board will inform the training company and apprentice in the case that there are any changes from what is listed in the preparation documentation.**

# AHK-USA CHICAGO

Final Examination Part 1 – Summer 2023

| Material Preparation List | Advanced Manufacturing Technician |
|---|---|

**General information**

The semi-finished products must correspond to the specified **standards**[1].

During the preparation, the general tolerances to the right must be adhered to. Even when tolerances are adhered to, function and fit must be considered for final assembly. Unless the dimension is underlined, all dimensions should be treated as finished dimensions (surface $\nabla$Rz16). For the surfaces marked with an asterisk *$\nabla$, applies

First angle projection applies to all drawings ( ).

General tolerances per ISO 2768

| Tolerance class | from 0.5 up to 3 | over 3 up to 6 | over 6 up to 30 | over 30 up to 120 | over 120 up to 400 |
|---|---|---|---|---|---|
| Average | ±0.1 | ±0.1 | ±0.2 | ±0.3 | ±0.5 |

[1]Note: In the United States, it is acceptable to use the US equivalent steel than that listed. It is also acceptable to mill a piece down to the proper metric dimensions listed although the drawings may indicate it should not be. Tolerances should still be followed, and equivalent material must be used.

## I Semi-finished material and quantity that each test taker must bring to the examination:

| | | | | |
|---|---|---|---|---|
| 1. | 1 Flat steel | 120* x 10* x 165 | EN 10278 S235JRC+C | prefabricated per Drawing 1 |
| 2. | 1 Flat steel | 120* x 10* x 80 | EN 10278 S235JRC+C | |
| 3. | 1 Flat steel | 55* x 10* x 87 | EN 10278 S235JRC+C | prefabricated per Drawing 2 |
| 4. | 1 Flat steel | 17 x 12* x 67 | EN 10278 S235JRC+C | |
| 5. | 1 Flat steel | 20* x 8* x 30 | EN 10278 S235JRC+C | |
| 6. | 1 Flat steel | 20* x 10* x 42 | EN 10278 S235JRC+C | |
| 7. | 1 Flat steel | 20* x 12* x 130 | EN 10278 S235JRC+C | |
| 8. | 1 Square steel | 20* x 130 | EN 10278 S235JRC+C | prefabricated per Drawing 3 |
| 9. | 1 Square steel | 25* x 122 | EN 10278 S235JRC+C | prefabricated per Drawing 4 |
| 10. | 1 Round steel | 6* x 12 | EN 10278 11SMn30+C | prefabricated per Drawing 5 |
| 11. | 1 Hexagonal steel | 19* x 47 | EN 10278 11SMn30+C | |
| 12. | 1 Sheet metal | 1.5* x 20 x 70.5 | EN 10131 DC01-A | prefabricated per Drawing 6 |
| 13. | 1 Sheet metal | 1.5* x 80 x 57 | EN 10131 DC01-A | prefabricated per Drawing 7 |
| 14. | 1 Sheet metal | 1.5* x 58 x 44 | EN 10131 DC01-A | prefabricated per Drawing 8 |

**EN10278 permissible width and thickness deviations for flat steel per ISO tolerance zone h11;**
**EN10278 permissible width and thickness deviations for square steel per ISO tolerance zone h11;**
**EN10278 permissible nominal diameter deviations for rod steel per ISO tolerance zone h11;**

## II Aid that must also be brought to the examination and can be shared with up to 5 apprentices from the same company if testing on the same day:

| | | | | |
|---|---|---|---|---|
| 1. | 1 Flat steel | 16 x 40 x 100 | EN 10278 S235JRC+C | see Drawing 10 |

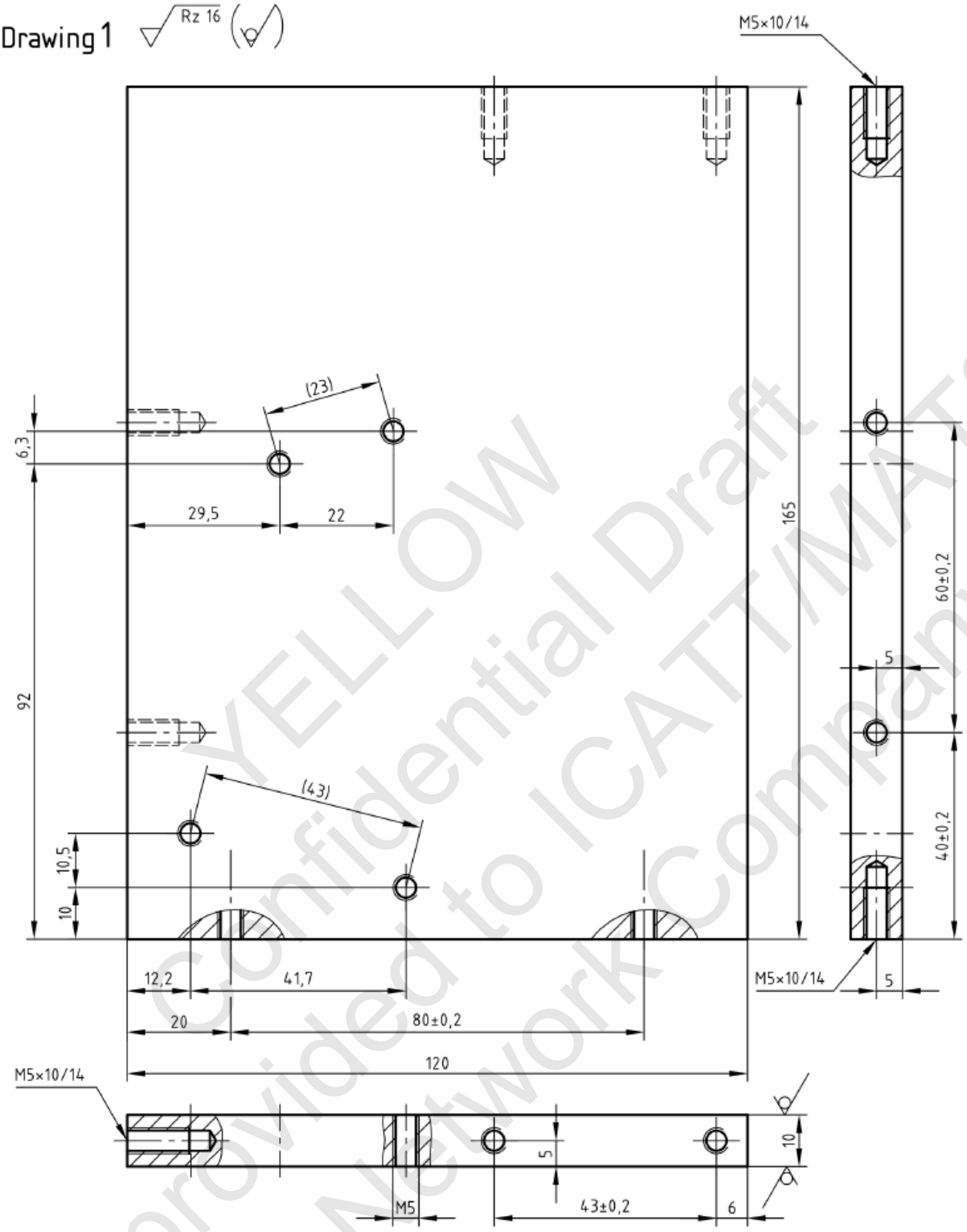
| **AHK-USA CHICAGO**<br>Final Examination Part 1 – Summer 2023 | |
|---|---|
| **Material Preparation List continued** | **Advanced Manufacturing Technician** |

**III Standard hardware and quantity that each test taker must bring to the examination:**

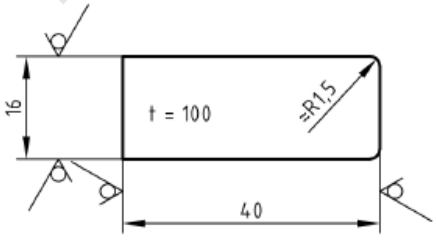
| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | 1 | Compression Spring | 0.5 x 5.5 x 12.3 | $i_f$ = 6.5 | Fst | see drawing 9 |
| 2. | 4 | Cap Screw | M5 x 8 | ISO 4762 | 8.8 | |
| 3. | 3 | Cap Screw | M5 x 12 | ISO 4762 | 8.8 | |
| 4. | 4 | Cap Screw | M5 x 16 | ISO 4762 | 8.8 | |
| 5. | 2 | Cap Screw | M5 x 20 | ISO 4762 | 8.8 | |
| 6. | 2 | Cap Screw | M5 x 25 | ISO 4762 | 8.8 | |
| 7. | 1 | Cap Screw | M5 x 30 | ISO 4762 | 8.8 | |
| 8. | 4 | Dowel pin | 5 x 20 - A | ISO 8734 | St | |
| 9. | 6 | Ball | Ø14 | ISO 5401 | St | |

**Please note: 2 nuts, flat, for the piston rod thread for the provided double-acting cylinder are required. See Ser. No. 4 in Standard Preparation List for the Pneumatic Control Variant.**

Drawing 1 Rz 16



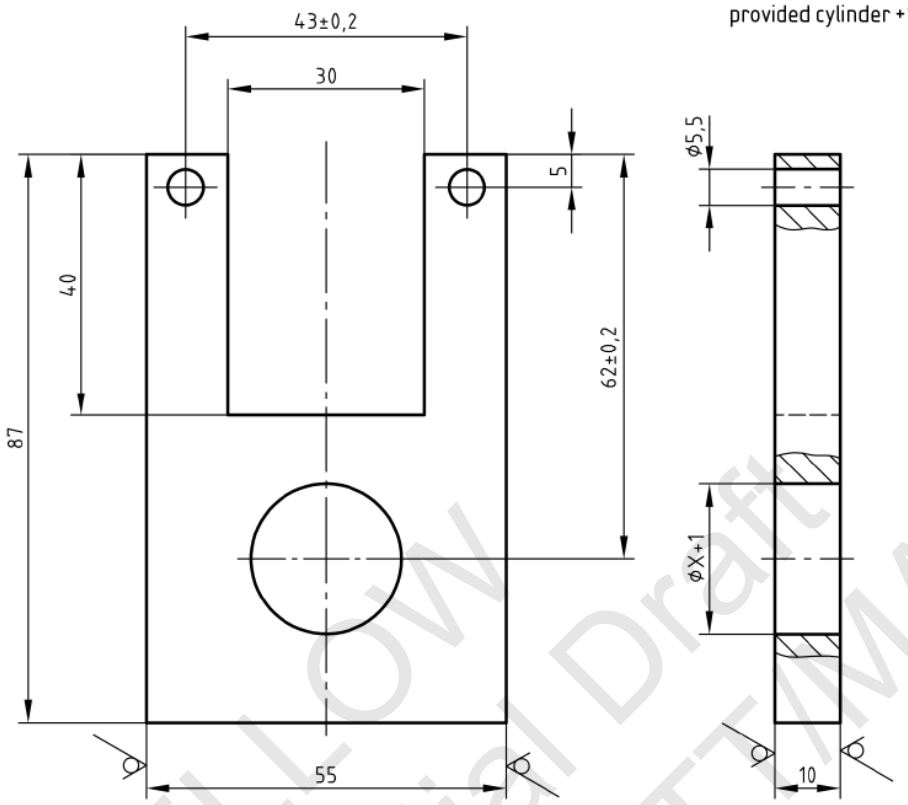

Drawing 10 Rz 16



## Drawing 2

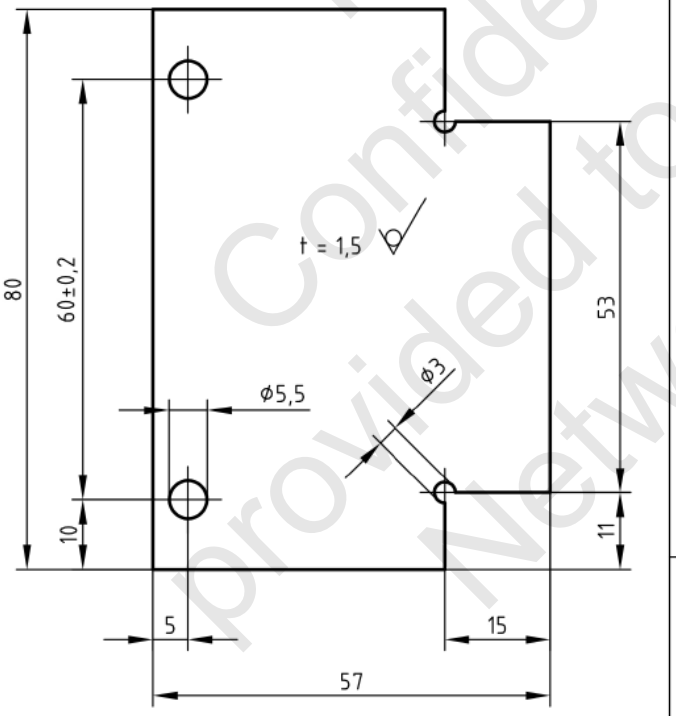
Rz 16

ØX+1 = Nominal thread diameter for the fastening thread of the provided cylinder +1mm



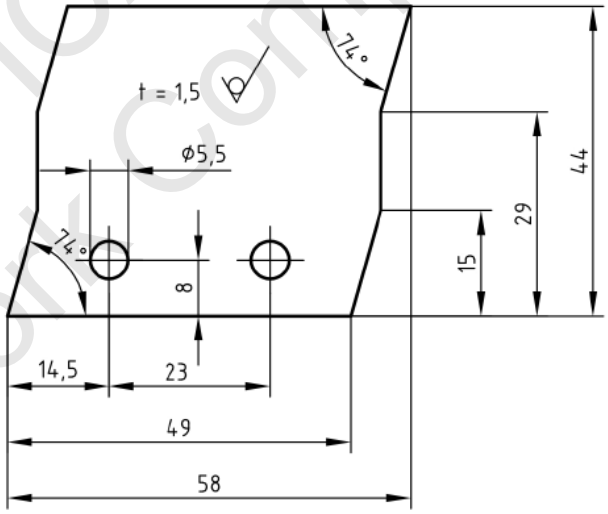

## Drawing 7

Rz 16

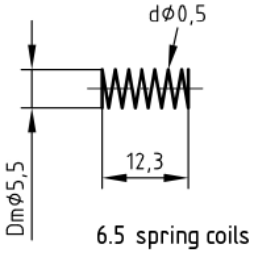



## Drawing 8

Rz 16



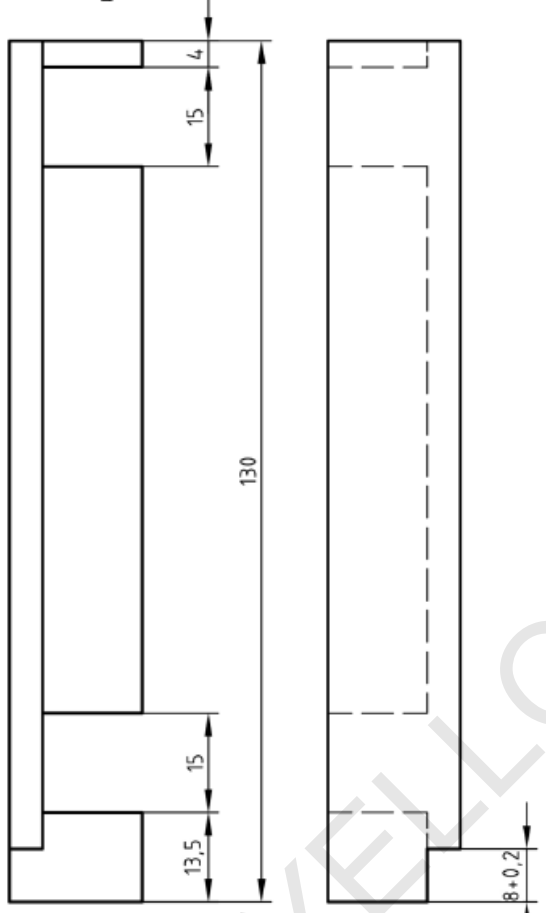

## Drawing 9




6.5 spring coils

## Drawing 3

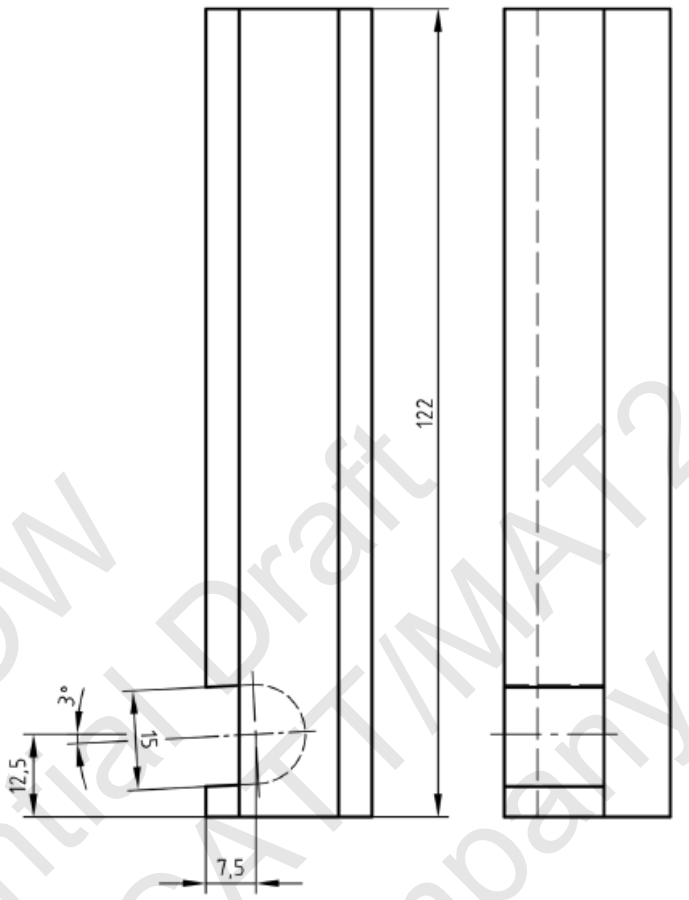
Rz 16




annealing recommended

## Drawing 4

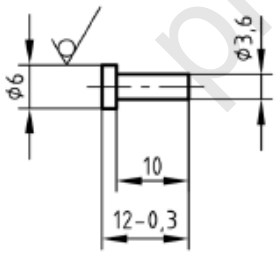
Rz 16




annealing recommended

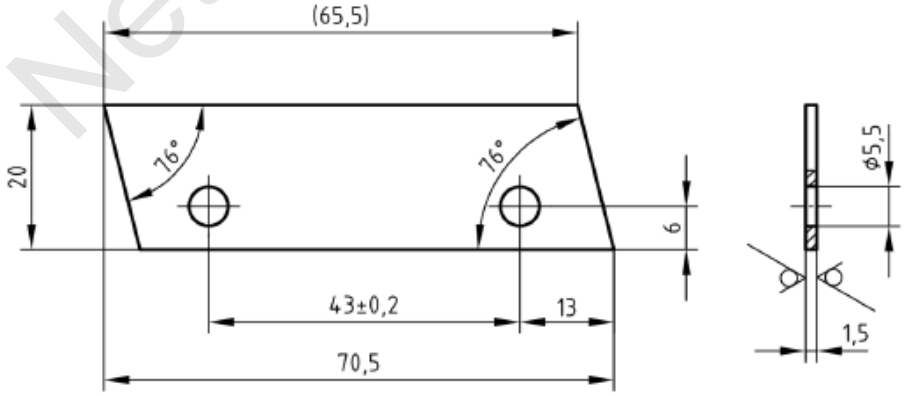
## Drawing 5

Rz 16




## Drawing 6

Rz 16



# AHK-USA CHICAGO

Final Examination Part 1 – Summer 2023

| **Standard Preparation List for the Pneumatic Control Variant supplied by Apprentice Training Company** | **Advanced Manufacturing Technician** |
|---|---|

**Components and auxiliary equipment that must be provided by the training company for each test taker and brought to exam.**

| Ser. No. | Qty. | Component name | Technical data Comments | Item no. and designation in diagram |
|---|---|---|---|---|
| 1 | 1 | Mounting plate | Size of the mounting surface 550 x 700 mm | |
| 2 | 4 | Spacer bolts | ∅ 18 x 120 mm, per diagram, with cylinder bolt M5 and washer 5 | |
| 3 | 1 | Name plate | approx. 60 x 30 mm, for the test taker number | xxx |
| 4 | 1 | Double-acting cylinder | Piston diameter: 25 mm, stroke: 100 mm, with adjustable end stop damping on both sides and permanent magnet, 2 pcs. Nuts on piston rod thread | |
| 5 | 2 | 5/2 directional control valve (air piloted) | Actuated on both sides by pressure | |
| 6 | 0 | 5/2 directional control valve | Actuated on one side by pressure with spring return | |
| 7 | 2 | 3/2 directional control valve | Activated by permanent magnet of the cylinder with spring return, blocked in rest position by pressure connection | |
| 8 | 0 | 3/2 directional control valve | Activated by roller with spring return, optionally locked or open in rest position by pressure connection | |
| 9 | 1 | 3/2 directional control valve (Lever operated) | Activated by lever or knob with notch, locked in rest position by pressure connection | |
| 10 | 2 | 3/2 directional control valve (push button operated) | Activated by push button, with spring return, normally closed, locked in rest position by pressure connection | |
| 11 | 1 | Time delay valve | 0 to approx. 10 s, locked in rest position by pressure connection | |
| 12 | 2 | Throttle check valve | Adjustable, recommended with screw thread, appropriate for the provided cylinder | |
| 13 | 1 | OR valve | | |
| 14 | 1 | AND valve | | |
| 15 | 1 | Distributor block | With hand slide valve, at least 6 connections, appropriate for the plastic hose provided, outlet for provided plastic hose | |
| 16 | 0 | Bracket | | |
| 17 | 0 | Quick exhaust valve | Suitable for direct assembly on the cylinder | |
| 18 | X | 90 degree quick connect fitting | Swiveling, outlet fits plastic hose provided, thread appropriate for the components provided | |
| 19 | 1 | Sealing plug | Fits the 5/2 directional valve actuated on both sides | |
| 20 | 7 | T-plug connector | Fits the plastic hose provided | |
| 21 | 5 | Multi-hose clamping bar for approx. 4 hoses or 15 hose clips*) | For fastening the plastic hose lines on the mounting plate | |
| 22 | 10 M | Plastic hose | Fits the connections provided Inner diameter min. 4mm | |
| 23 | X | Adhesive label | approx. 7 x 15 mm for marking components provided | |
| 24 | 1 | Screwdriver | For adjusting the end position damping | |

Additional notes:

1. The mounting plate must permit quick connection of the pneumatic components, e.g. quick connection clipping slide in assembly recommended.
2. For fastening the mechanical module (base plate t = 10 mm), the carrier can be used. Alternatively, e.g. for fastening on perforated plate, at least 2 pcs. screws M5x25, 2 pcs. nuts M5, 2 pcs. washers 5 are needed, or for boards, at least 2 pcs. fastening elements.
3. It must be possible to identify the connecting locations of the valves (letters or numbers).
4. The components are to be properly provided with push-in threaded fittings and, if necessary, sound absorbers.
5. The cylinder must be provided with no damping in the end positions.