

Operating Instruction Manual

Collet Clamping Chuck



These operating instructions are part of your product and are intended for all persons who perform work with this tool. They must be read and understood before the initial operation of the tool and must always be stored in an accessible manner.

Always use original spare parts from OERTLI Werkzeuge AG.



Translation of the original instructions

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1. Description

The collet clamping chuck is an universal clamping adaptor for shank tools. By changing the collet, it is possible to clamp almost all shank diameters in the same collet clamping chuck within the norm-range. Through tightening the collet nut, the collet clamps gradually the tool shank, thereby firmly clamping the tool in the chuck. Because the collet deforms elastically through tightening, shanks with somewhat larger tolerance deviations can be safely used.

1.1. Appropriate Application

The collet clamping chuck serves as connection between the spindle drive of the machine and the tool under consideration of suitable operating conditions.

Tool shanks to be clamped are:

- Cylindrical tool shanks
- Tolerances for tool shanks:
nominal diameter $+0 / -0.5$ mm (valid for double slotted collets)

Place and mode of application:

- Woodworking machinery, mainly routing machines
- Max. RPM:
HSK 63 and SK 30 = 24'000 1/min
SK 40 and MK 2 = 18'000 1/min
- Min. clamping length according to chapter "minimum clamping length" or "optimum clamping length"
- Max. tool weight according to chapter "allowable tool weight for collet clamping chucks"
- Max. tool diameter according to chapter "allowable tool diameter for collet clamping chucks"
- Max. projection length according to chapter "allowable projection length for collet clamping chucks"

1.2. Design variants

1.2.1. Connection for spindle drive

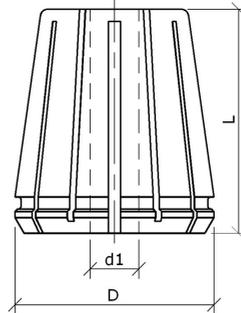
The collet clamping chuck is available with various shank connections:

- HSK-F 63 and HSK-E 63 (Hollow Taper Shank)
- SK 30 (Steep Taper Shank)
- SK 40 (Steep Taper Shank)
- MK 2 (Morse Taper Shank)
- Cylindrical shank $\varnothing 25$ mm

1.2.2. Bore for shank tools

The collet clamping chuck may take various shank diameters by changing the collet. It exists a new and ancient marking style.

New standard designation (since 2003):



- A: Shape A, 6 to 8 slots
- B: Shape B, 12 to 16 slots

Standard	Nominal size	Shank diameter d1 [mm]
ISO 15488	A25	1 - 16
ISO 15488	B25	2 - 16
ISO 15488	A32	2 - 20
ISO 15488	B32	3 - 20
ISO 15488	A40	3 - 26
ISO 15488	B40	4 - 26

Standard	Nominal size	Shank diameter d1 [mm]
ISO 10897	A16	2 - 16
ISO 10897	B16	5 - 16
ISO 10897	A25	2 - 25
ISO 10897	B25	6 - 25

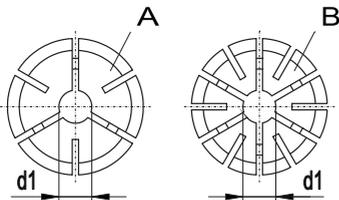
Old Standard designation:

Standard	DIN nominal size	EURO standard marking	Shank diameter d1 [mm]
DIN 6499	ER 25	430 E	1 - 16
DIN 6499	ER 32	470 E	2 - 20
DIN 6499	ER 40	472 E	3 - 25
DIN 6388	OZ 16	415 E	2 - 16
DIN 6388	OZ 25	462 E	2 - 25

The nominal diameter for both types of marking are marked on the collet chuck.

1.2.3. Collets

Basically we use double slotted collets with through clamping bores. Only such collet types allow an optimized power transmission within the whole clamping range.



New standard designation (since 2003):

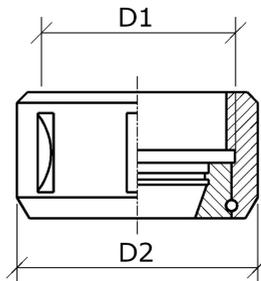
ISO-Standard	Nominal size	d1 [mm]	D [mm]	L [mm]
15488	A25	1 - 16	26.1	34
15488	B25	2 - 16	26.3	34
15488	A32	2 - 20	33.1	40
15488	B32	3 - 20	33.35	40
15488	A40	3 - 26	41.1	46
15488	B40	4 - 26	41.4	46

ISO-Standard	Nominal size	d1 [mm]	D [mm]	L [mm]
10897	A16	2 - 16	25.5	40
10897	B16	5 - 16	25.5	40
10897	A25	2 - 25	35.05	52
10897	B25	6 - 25	35.05	52

Old Standard designation:

DIN nominal size	EURO standard marking	d1 [mm]	D [mm]	L [mm]
ER 25	430 E	1 - 16	26	34
ER 32	470 E	2 - 20	33	40
ER 40	472 E	3 - 25	41	46
OZ 16	415 E	2 - 16	25.5	40
OZ 25	462 E	2 - 25	35.05	52

1.2.4. Collet nuts



New standard designation (since 2003):

ISO-Standard	Nominal size	D1 [mm]	D2 [mm]
15488	25	M32 x 1.5	42
15488	32	M40 x 1.5	50
15488	40	M50 x 1.5	63
10897	16	M33 x 1.5	43
10897	25	M48 x 2.0	60

Old Standard designation:

DIN nominal size	EURO standard marking	D1 [mm]	D2 [mm]
ER 25	430 E	M32 x 1.5	42

DIN nominal size	EURO standard marking	D1 [mm]	D2 [mm]
ER 32	470 E	M40 x 1.5	50
ER 40	472 E	M50 x 1.5	63
OZ 16	415 E	M33 x 1.5	43
OZ 25	462 E	M48 x 2.0	60

1.3. General warranty conditions

The warranty services only include the repair or replacement of defective tools and clamping devices made by OERTLI that are subject to manufacturing or material faults. The warranty period starts with the date of purchase and is specified in the general conditions of business.

2. Security Advice

Our clamping devices and tools correspond to the state of the art and were produced in accordance with EN 847-1 and the subsequent European Standards.

The regulations of the machine manufacturer must be adhered to for safe use of the clamping device or tool. The relevant regulations are provided in the respective operating instructions of the wood processing machine used.

Obtain information regarding the location and function of the safety devices required for your wood processing machine before using the tool.

Work may only be performed by appropriately trained specialist staff familiar with handling wood processing tools and machines as well as the relevant clamping devices.

This tool or clamping device may only be used for the purpose described under "appropriate use" and in compliance with the following safety instructions.

2.1. Signal words

The following Signal words refer to the different levels of danger:

DANGER

The "DANGER" signal word indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

The "WARNING" signal word indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

The "CAUTION" signal word indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

The "NOTICE" signal word indicates risks that might result in damage to goods.

2.2. General sources of risk

2.2.1. Injuries due to contact with cutting parts

Source of risk	Contact with cutting parts on the tool.
Consequences	Cutting, piercing and crushing injuries.
Probability	Contact with the tool always poses a risk of injury.
Avoidance	Wear safety gloves that were tested according to EN 388.
In emergencies	Perform first aid. Consult a doctor.

2.2.2. Falling parts

Source of risk	Damage to persons or goods due to falling parts.
Consequences	Crushing, bruises in the foot area and/or damaged tool.
Probability	Always during transport or inappropriate storage.
Avoidance	Transport in suitable packaging or device. Wear suitable safety shoes.
In emergencies	Perform first aid. Contact the supplier/manufacturer.

2.2.3. Defective parts or elements

Source of risk	Worn or wrongly mounted parts that may cause eccentricity or reduce the clamping force.
Consequences	Damage to the tool.
Probability	During installation and removal work and after prolonged use or storage.
Avoidance	By regular, visual inspection. Only use original parts.
In emergencies	Check the tool for damage. Have the tool promptly checked by the manufacturer when damage has occurred.

2.2.4. Fastening torque

Source of risk	Tightening screws that have been fastened with too low or too high fastening torque.
Consequences	Damage to the tool due to reduced clamping force of the clamping system.

Probability

When the tool has not been used for a prolonged time.

Avoidance

Fasten all screws using a low-recoil torque wrench. Check tightening screws that have not been loosened for a prolonged period (e.g. after preservation).

In emergencies

Immediately deactivate the tool and have it inspected by the manufacturer as required when the tightening screws can no longer be fastened with the fastening torque specified.

2.2.5. Modification of OERTLI products

Source of risk

Unauthorised modifications of tools and clamping devices by the user.

Consequences

Severe damage to persons and/or goods.

Probability

Always in case of unauthorised modifications by the user.

Avoidance

Only have modifications performed directly by the OERTLI company or with their approval. Always use original spare parts.

In emergencies

Perform first aid. Contact the supplier/manufacturer.

2.3. Protective equipment required



Protective goggles

Protective goggles protect the eyes against flying particles during wood processing and against possible splashes of liquid during tool cleaning.



Safety gloves

Safety gloves protect against cutting and piercing injuries while touching, mounting or removing the tool. Only use safety gloves that have been tested according to EN 388 (mechanical risks).



Hearing protection

Hearing protection protects the ears from increased noise exposure during wood processing.



Safety shoes

Safety shoes are used to protect the feet against dropping objects.

Any additional protective equipment that may be required is specified in the operating instructions of the machine manufacturer..

3. Start Up

3.1. Unpacking/Transportation



⚠ WARNING

Very sharp cutting edges pose a risk of cutting and piercing when touching the tool.

Be cautious when unpacking or packing as well as when handling.

Do not touch tools at the cutting edges.

Wear appropriate protective gloves (according to EN 388).

⚠ WARNING



Risk of cutting and crushing by dropping tools.

Only transport and store tools in suitable packaging or devices.

Ensure that the tool is correctly positioned in the holder.

Wear appropriate safety shoes when working with heavy tools.

NOTICE

Damage to the clamping adaptor and to the tool due to strike against foreign material.

Be cautious when unpacking or packing as well as when handling.

Always put tools on soft supports.

Transport clamping adaptors and tools only in a suitable packing.

Always use the original packing for transport.

3.2. Installation/Assembly

NOTICE

Clamping adaptors with steep cone shank require a holding bolt. Without it, the tool is not held in the spindle.

Damage to the clamping adaptor and the tool due to not mounting a holding bolt.

Mount the corresponding holding bolt into the steep cone shank before the tool is put onto the machine.

NOTICE

Damage to the tool, to the cutting edges and to the knife clamping systems as well as to the clamping

adaptors due to loss of clamping forces.

All clamping surfaces must be free from dirt, oil, grease and water.

Regularly check all clamping devices for damage and immediately replace damaged devices.

Do not use fibre materials, such as cotton waste for cleaning.

DANGER



Risk of cutting, crushing and mortal danger due to unintentional machine start during tool or cutter exchange.

Disconnect the power supply to the machine.

Ensure that the machine cannot be switched on by third parties during operation.

Mount and secure the clamping adaptors and the tools according to instructions of the machine manufacturer! Consider necessary information from the instruction manual of the woodworking machine in use.

4. Attendance/Operation

WARNING



Danger of injuries or danger of crushing by the rotating tool.

Do not touch the rotating tool.

Do not slow down the tool by lateral pressure against the tool body.

Do not work without necessary safety guard.

4.1. Prior to operation

Check the clamping adaptors and the tools for damage and check the seats of the clamping elements as well as the condition of the cutting edges.

For maintenance work on damaged or dull cutting edges refer to chapter "Maintenance/Cleaning" of the corresponding wood working tool.

For proceeding with respect to preservation and storage, refer to chapter "Preservation/Storage" in this maintenance manual.

WARNING



Tool breakage or cutting edge breakage by overload.
Cutting injuries, crushing injuries or danger of life due to fly-away parts.

Do not re-install neither damaged or modified clamping adaptors and tools nor clamping adaptors and tools with corroded screw connections.

Maintenance work on damaged clamping adaptors and tools to be carried-out only by the manufacturer of clamping adaptors and tools.

Applicable machine parameters such as speed, direction of rotation and feed to be checked and verified with the parameters of the clamping adaptor and tool.

For compound tools (tipped tools), the rest height or rest thickness of the attached cutting plate is not to be less than 1 mm.

Check screw connections for corrosion after transport or after a longer storage time, respectively a longer unused time. Corroded screws must be replaced. Threaded holes must be checked for correct tolerances and strength.

WARNING

Due to transport, strong working vibrations or long storage times, alternatively parts not being used for a long time, so called resting-effects may occur due to vibrations

and temperature differences on screw connections. As a result, screw clamping forces are considerably lost.
 Danger of cutting injuries, crushing injuries or danger of life due to fly-away parts.

Tighten all screws to the required torque before each use.

Protect clamping adaptors and tools with screw connections from vibrations.

Store clamping adaptors and tools at mostly constant temperatures.

4.2. Possible Feed Systems

Single-part tools may be assembled to a tool set or to a tool combination. Tools from such sets or combinations which are not suitable for hand feed will be equipped with a pin in the hub area to avoid using them as single-part tool.



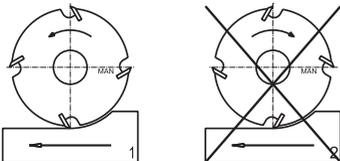
⚠ WARNING

For manual feed exists danger of injuries, danger of crushing or danger of life by tool kick-back.

Manual feed requires working only against the feed.

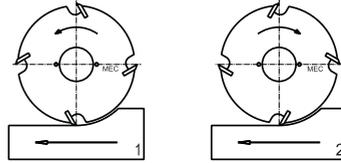
Do not use individual -with pins secured- tools for manual feed.

The tool inscription indicates whether your tool is suitable for manual feed or for mechanical feed:



Marking MAN:
 => suitable for manual feed

Operation:
 => only against the feed (1)



Marking MEC:
 => suitable for mechanical feed

Operation:
 => against the feed (1) or with the feed (2)

Ensure that the correct machine parameters have been set before starting work.

4.3. Allowable range of spindle RPM

⚠ WARNING

Tool breakage due to overload. Cutting injuries, crushing injuries or danger of life by fly-away parts.

Some clamping adaptors are allowed to be used only for one direction of rotation. Check a possibly pretended direction of rotation of the clamping adaptor with that of the tool as well as with that of the machine.

For shank type tools and tools with bore, for example on clamping bushes:

Check the maximum permissible speed of the clamping adaptor with that of the used tools. The respective smallest value is the maximum admissible speed of the corresponding tool combination. Do not exceed the smallest maximum speed of all participating clamping adaptors and tools.

For tools with bore, for example on CNC-clamping shafts:

Tools with bore on CNC-clamping shafts with for example HSK- or Steep Taper Cones are not allowed

to be operated without checking the strength.

The operating speed must be checked separately for each tool combination. Whether the calculation for the corresponding tool combination has been made, can be seen on the customer drawing. If no customer drawing is available for a tool combination, the operational stability has to be checked.

⚠ WARNING



For manual feed exists danger of injuries, danger of crushing or danger of life by kick-back of the workpiece, if the allowed range of speed falls short of.

Do not fall short of the allowed range of speed for manual feed.

4.3.1. Marking of tools and tool sets

OERTLI ← A
XX XXXXXXXX XXX ← B
D x B x d ← C
MEC
n max. 10100 ← D

- A: Brand name / manufacturer
- B: Item / tool number
- C: Dimension [mm] and MAN/MEC marking
- D: Maximum rotation speed or permitted rotation speed [1/min] e.g. n max. 10100

Markings of tools are on the tool body and markings of tool sets are on the clamping device.

4.4. Clamping of Shank Tools

In order that the forces arising by the cutting process are transmitted safely, highest requirements are to be met by the clamping adaptors and its applications.



⚠ WARNING

Damage of the tool, the cutting edges and the knife clamping systems as well as the clamping adaptor due to loss of clamping forces.

Cutting injuries, crushing injuries or danger of life due to fly-away parts.

Damaged clamping parts, such as screws, collets, holding bolts and clamping nuts must be replaced.

Compare the effective diameter of the tool shank with the given tolerances of the clamping adaptor. Do not mount shank tools with shank diameters outside allowable tolerances into clamping adaptors.

⚠ WARNING

Tool rupture due to overload or imbalance.

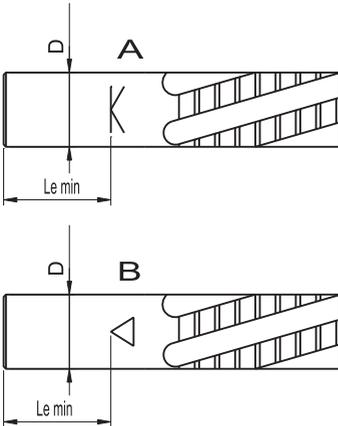
Cutting injuries, crushing injuries or danger of life due to fly-away parts.

Compare the given parameters of the clamping adaptor regarding clamping length with the identification mark on the shank tool. Use the **larger value** as minimum clamping length.

Measure the clamping eccentricity (em) of your clamping adaptor and compare the value with the inscription on the tool (e). Use the clamping adaptor only, if "em ≤ e". Consider thereby the procedure in chapter "Measuring the clamping eccentricity".

Clamping adaptors with a value "em > 0.1" should not be used anymore. As required, recondition the clamping adaptor by the supplier.

4.4.1. Minimum clamping length according to EN 847-2



- A: Old marking
 B: New marking according to EN 847-2

Shank diameter, D [mm]	Min. clamping length, Le [mm]
$D \leq 10$	≥ 20
$10 < D < 25$	$\geq 2.0 \cdot D$
$D \geq 25$	$\geq 1.8 \cdot D$

4.4.2. Marking of shank tools



- A: Clamping length marking
 B: Dimension [mm]
 C: Cutting material and MAN/MEC marking
 D: Maximum rotation speed [1/min] e.g. n max. 18000
 E: Maximum permitted eccentricity (e)

The marking is on the tool shank.

4.4.3. Measuring of clamping eccentricity

The clamping eccentricity can be determined by using a test mandrel. It has to comply with the following requirements:

- Test mandrel diameter tolerance "h7" for $d \geq 12$ mm and "h8" for $d < 12$ mm
- Test mandrel accuracy = 0.002 mm
- Surface roughness max. $R_a = 0.4 \mu\text{m}$
- Hardened

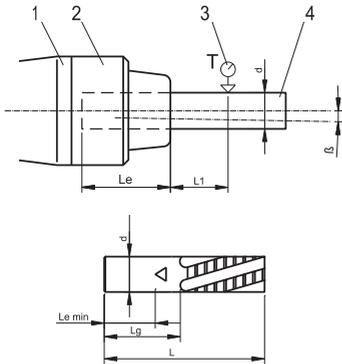
A measuring gauge is required to determine the eccentricity. It has to comply with the following requirements:

- Measuring gauge resolution = 0.001 mm
- Measuring gauge accuracy = 0.006 mm

The diameter (d) of the test mandrel is the shaft diameter of the clamping device.

The following equation applies regarding the eccentricity measured (em):

$$e_m = \frac{T}{2}$$



- 1: Drive spindle / clamping device shaft
- 2: Clamping device
- 3: Test point
- 4: Test mandrel

L1: $((L-Le)/2) + 10$ [in mm]

Lg: Shaft length of the tool

d: Test mandrel diameter

Le: Clamping length of the test mandrel / tool

L: Total tool length

T: Concentricity error at the test point

β: Angular error

The information regarding Le is provided in the chapter "Minimum clamping length according to EN 847-2".

The eccentricity measured (em) must be smaller or equal to the permitted eccentricity (e).

$$e_m \leq e$$

The permitted eccentricity (e) is specified on the tool.

4.5. Allowable tool weight and tool dimensions for clamping devices with steep taper shank (SK)

Since October 2013 each CNC clamping device has to be calculated in accordance to the european security standard EN 847-2 for his rupture strength. For a corresponding tool combination (tool set) this calculation can lead to a reduction of the maximum rotational speed.

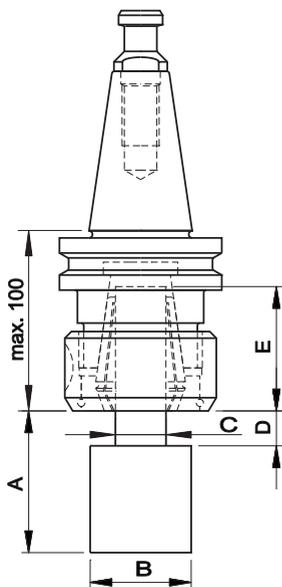
⚠ WARNING

Rupture of tool or clamping device due to overload.
Injury or death due to stray components in operation.

Consider the given parameters regarding max. allowable weight, projection length and tool diameter of the corresponding clamping device. Compare these given parameters with the maximum given figures of the woodworking machine in use.

Under no circumstances, do not exceed any of these given parameters without permission of the corresponding supplier.

The following information is based on maximum values. Within these figures the tools may be operated without risk in the corresponding clamping adaptors. Tools which are outside these figures must be checked for operating strength by the supplier.



- A: Projection length
- B: Tool diameter
- C: Shank diameter
- D: free Shank length
- E: Clamping length

4.5.1. Allowable tool weight for collet chucks (SK 40)

Shank diameter, C [mm]	Max. tool weight [g]
2 - 5	30
6	80
8	180
10	400
12	550
14	850
16	1250
18	1650
20	2100
25	3600

4.5.2. Allowable tool diameter for collet chucks (SK 40)

Shank diameter, C [mm]	Max. tool diameter, B [mm]
2 - 5	as shank-Ø
6	20
8	30
10	40
12	50
14	65
16	75
18	90
20	100
25	130

4.5.3. Allowable projection length for collet chucks (SK 40)

B [mm]	A [mm]													
	C [mm]													
	Ø2 - 5	Ø6	Ø8	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø25				
2	47													
3	58													
4	66													
5	74													
6	81													
8	68	94												
10	59	82	105											
12	53	73	94	115										
14	48	66	85	105	124									
16	44	61	78	96	114	133								
18	41	57	73	89	106	123	140							
20	38	53	68	84	99	115	132	148						
25		45	59	72	86	100	114	129	165					
30		40	52	64	77	89	102	115	147					
35			47	58	69	81	92	104	133					
40			43	53	64	74	85	95	123					
45				49	59	68	78	88	114					
50					46	55	64	73	83	106				
55						51	60	69	78	100				
60							48	56	65	73	94			
65							46	53	61	69	90			
70								51	59	66	85			
75									48	55	63	82		
80										53	60	78		
85											51	58	75	
90												49	56	72
95													54	70
100														68
105														65
110														64
115														62
120														60
125														58
130														57

- A: Max. projection length
- B: Tool diameter
- C: Shank diameter

4.5.4. Allowable tool weight for collet chucks (SK 30)

Shank diameter, C [mm]	Max. tool weight [g]
2 - 5	30
6	80
8	180
10	400
12	550
14	850
16	1250
18	1500
20	1800
25	2650

4.5.5. Allowable tool diameter for collet chucks (SK 30)

Shank diameter, C [mm]	Max. tool diameter, B [mm]
2 - 5	as shank-Ø
6	20
8	30
10	40
12	50
14	65
16	75
18	90
20	100
25	130

4.5.6. Allowable projection length for collet chucks (SK 30)

B [mm]	A [mm]									
	Ø2-5	Ø6	Ø8	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø25
2	47									
3	58									
4	66									
5	74									
6		81								
8		68	94							
10		59	82	105						
12		53	73	94	115					
14		48	66	85	105	124				
16		44	61	78	96	114	133			
18		41	57	73	89	106	123	140		
20		38	53	68	84	99	115	132	148	
25			45	59	72	86	100	114	129	153
30			40	52	64	77	89	102	115	125
35				47	58	69	81	92	104	106
40				43	53	64	74	85	91	92
45					49	59	68	78	80	81
50						46	55	64	71	73
55							51	60	64	66
60							48	56	58	60
65								46	52	54
70									48	49
75									46	
80										47
85										
90										
95										
100										
105										
110										
115										
120										
125										
130										

- A: Max. projection length
- B: Tool diameter
- C: Shank diameter

4.6. Allowable tool weight and tool dimensions for clamping devices with hollow taper shank (HSK)

Since October 2013 additionally each clamping device with a HSK interface has to be calculated in accordance to the european security standard EN 847-2 for his operational strength. This calculation has many influencing factors so that no tabular statement of the boundry values can be made.

⚠ WARNING

Rupture of tool or clamping device due to overload.
Injury or death due to stray components in operation.

Each tool combination which is fixed on a clamping device with a HSK interface has to be calculated

in accordance to the european security standard EN 847-2 for his operational strength.

The information with which maximum rotational speed the tool combination (tool set) can be operate is written on the tool drawing.

4.7. Application parameters

⚠ WARNING

Tool breakage due to overload. Cutting injuries, crushing injuries or danger of life by fly-away parts.

Make sure that operating vibrations are as small as possible.

As required, adjust feed rate, speed and cutting depth.

Improve clamping stability of the work-piece.

4.8. Reasons for a possible knife -, resp. tool rupture

The following reasons may lead to a knife rupture:

- Grinding cracks or change of the cutting geometry due to improper sharpening
- Jerking movements of the work-piece
- Jam of the tool by a waste piece (especially by cut-out work)
- Overheating by friction due to too small feed rate or too small cutting depth as well as due to dull cutting edges
- Too high feed rate
- Too large cutting depth
- Insufficient clamping of the tool
- Vibrations of the machine

NOTICE

High advance during processing may cause damage to the tool.

Check all processing data and adapt or reduce the values as required before each use of the tool.

5. Maintenance/Cleaning

Clamping adaptor quality and tool quality as well as work safety are only guaranteed, if the clamping adaptor and the tool is checked and cleaned before used.

Required tightening torques to be exactly maintained when screws are tightened (use proper torque wrench). Only by this manner sufficient clamping is guaranteed.

⚠ WARNING

Tool- or knife rupture due to imbalance of not mounted reversible- or inserted knives.

Cutting injuries, crushing injuries or danger of life by fly-away parts.

Do not mount unsymmetrically reversible knives and inserted knives.

Always use the same screws and clamping parts per cutting system.

⚠ WARNING

Tool- or knife rupture due to corroded screw connections.

Cutting injuries, crushing injuries or danger of life by fly-away parts.

Damaged or corroded screws and clamping parts must be replaced. In addition corresponding threaded holes must be checked for accuracy and strength.

⚠ WARNING

Tool- or knife rupture due to overload from worn -or damaged knife cutting edges.

Cutting and crushing injuries as well as mortal danger during operation due to flying parts.

Use only original spare parts from OERTLI Werkzeuge AG.

For reversible knives or inserted knives:

- Do not re-sharpen, but replace in time
- Do consider thereby the instruction manual for changing knives for the corresponding knife system

For compound tools and single-part tools such as saw blades, diamond tipped cutters or tungsten carbide tipped cutters, solid tungsten carbide spiral cutters:

- Re-sharpen or replace
- Do consider thereby the corresponding information in chapter "Maintenance work"

Dull or damaged cutting edges must be sharpened or replaced, if:

- the wear-out part of the cutting edges are greater than 0.2 mm (consider especially the main wear-out parts!)
- Break-outs on the cutting edge are visible
- Burns on the wood are visible
- the surface on the work piece does not comply anymore with the desired requirements
- the power requirement of the machine increases considerably (more than 10%)

5.1. Maintenance Work

5.1.1. Instructions for tool change for collet chucks

(see Fig. 1 and 2)

Consider unconditionally all terms and restrictions from chapter "Attendance/Operation".

WARNING

Damage of the tool, cutting edges and knife clamping systems as well as the clamping adaptor due to loss of clamping forces.
Cutting injuries, crushing injuries or danger of life due to fly-away parts.

Collet holder, collet nut as well as the collet must be of the same type (for example 472 E).

The nominal diameter of the collet used must always correspond to the diameter of the shank. The tolerance allowed for double grooved collets is the nominal diameter +0 / -0.5 mm.

Use only double grooved collets.

Do not use clamping sleeves nor reducing bushes.

Always clamp directly according to the shank diameter of the tool.

1. Clean clamping component and tool first.
2. Loosen the clamping nut (1) of the collet chuck so far, until the collect becomes loose and the tool (3) can easily be removed from the chuck.
3. Remove the tool from the collet chuck.
4. Clean the collet, the collet nut and the collet chuck as well as the shank of the new to be installed tool. Make sure that all clamping surfaces are free from dirt, oil, grease and water.
5. Check the shank diameter of the new tool and verify that it meets the nominal range of the collet size. The shank diameter should not fall short of 0.5 mm of the nominal diameter of the collet.
6. In case the clamping diameter should be changed, please consider the necessary steps outlined in chapter "Instructions for changing collets".
7. Put the shank of the new tool into the connecting bore of the collet chuck.
8. Make sure that the min. required clamping length according to shank diameter is maintained. Consider also the instructions in chapter "Optimum clamping length for shank tools".
9. Tighten the clamping nut with a suitable torque wrench to:
100 Nm for A25 / B25 (ISO 15488)
120 Nm for A32 / B32 (ISO 15488)
150 Nm for A40 / B40 (ISO 15488)
100 Nm for A16 / B16 (ISO 10897)
145 Nm for A25 / B25 (ISO 10897)

10. Make sure that for steep taper shanks (4) the suitable holding bolt (5) is screwed into the connecting bore provided for, before the tool is mounted into the machine drive spindle.

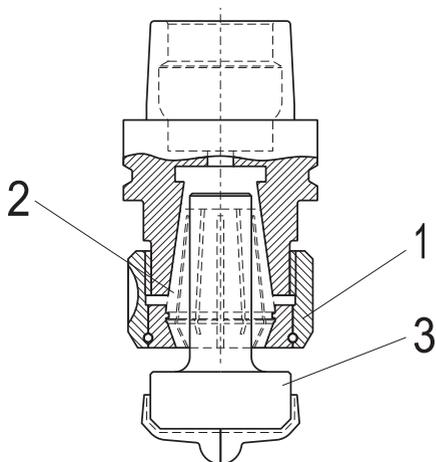


Fig. 1

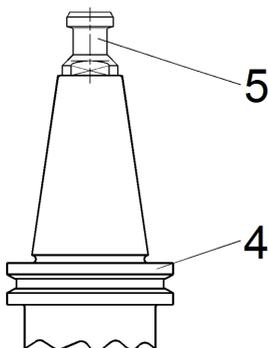
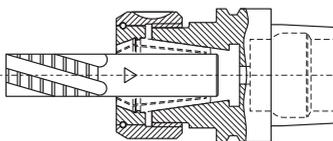


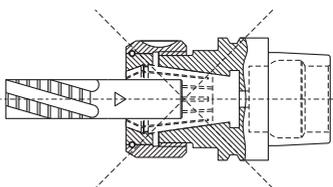
Fig. 2

5.1.2. Optimum clamping length of shank tools

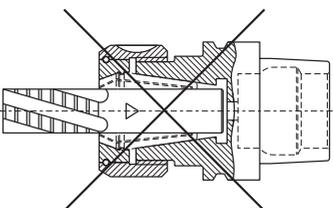
When clamping the shank tool be sure that the free shaft length is as short as possible.



Optimal clamping length



Minimum clamping length (not optimal)



Too deep clamping length (not permitted)

5.1.3. Instructions for collet change

(see Fig. 3 and 4)

1. Clean clamping adaptor and tool first.
2. Remove first a possible tool from the collet clamping chuck. Consider therefore the procedure in chapter "Instructions for tool change for collet chuck".
3. Afterwards remove completely the clamping nut with the collet from the collet clamping chuck.
4. Remove the collet from the clamping nut by lateral pressing (see Fig. 3).
5. Select a new collet according the shank diameter of the tool.
6. Put the clamping nut on a flat even surface and put the new collet slightly

tilted onto the clamping nut. Click now the collet -by pressing from top- into the clamping nut (see Fig. 4).

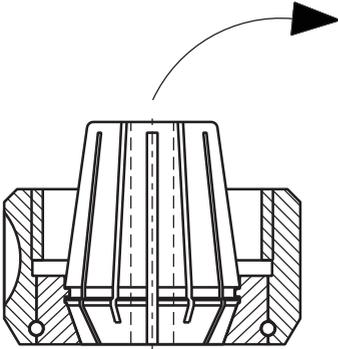


Fig. 3

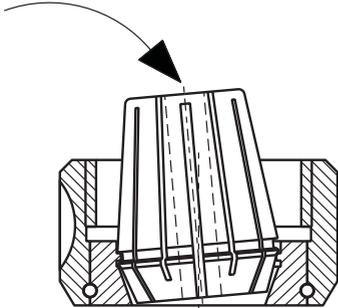


Fig. 4

5.1.4. Tightening torques

⚠ WARNING

Insufficient clamping, screw breakage or damage due to overload. Risk of injuries and mortal danger during operation due to flying parts.

Use a recoil-free torque spanner.

Do not mount tools or clamping devices in a heated or undercooled state.

The fastening screws must be tightened in a sequence from the

middle towards the outside applying the appropriate torque, when more than two screws per clamping unit have to be fastened.

Clamping nuts for Collet Clamping Chucks:

Clamping nut D2=42 mm: M32 x 1.5 = 100 Nm

Clamping nut D2=50 mm: M40 x 1.5 = 120 Nm

Clamping nut D2=63 mm: M50 x 1.5 = 150 Nm

Clamping nut D2=43 mm: M33 x 1.5 = 100 Nm

Clamping nut D2=60 mm: M48 x 2.0 = 145 Nm

Holding bolts for Steep Taper Shanks:

Holding bolt M10 = 20 Nm

Holding bolt M12 = 24 Nm

Holding bolt M16 = 30 Nm

5.1.5. Behaviour after a tool collision

⚠ DANGER



After a tool collision or after high working vibrations, the strength of the brittle cutting edge material and the hardened clamping adaptor is not guaranteed anymore. High vibrations or a collision of the tool act like blows on the cutting edges. For very high loads due to high cutting speeds in woodworking, such pre-damaged tools and clamping adaptors may lead to tool rupture. Ruptured tool parts act like bullets at high working speeds! Danger of cutting injuries, danger of crushing or danger of life due to fly-away ruptured tool parts!

Do not re-use damaged tools or deformed tools and clamping adaptors.

Repair work and maintenance work on tools and clamping adaptors to be carried-out only by the tool manufacturer.

Tool and clamping adaptor to be checked for micro-damages. In addition, verify the tool connection of the machine.

5.1.6. Cleaning

NOTICE

To achieve highest precision and best performance, it is important to clean tools and clamping adaptors regularly as required according to application.

Damage of the tool, the cutting edge and the knife clamping system as well as the clamping adaptor due to loss of the clamping force.

All surfaces used for clamping must be free from dirt, oil, grease and water.

Rinse and dry tools after cleaning with a solvent.

Do not use fibrous materials, such as cotton waste, for cleaning.

⚠ WARNING

Material weaknesses and expansion may result when the temperatures of the clamping system are too high. This may cause damage to the clamping system.

Cutting and crushing injuries as well as mortal danger due to flying parts.

Ensure that the tools and clamping devices are not heated above 60 °C.

⚠ WARNING

The use of cleaning agents that are unsuitable for the basic aluminium body poses a risk of corrosion. Corrosion may lead to failure of the tool elements.

Risk of injuries and mortal danger



during the operation due to flying parts.

Only use suitable, water-soluble, special cleaning agents based on solvents that are suitable for aluminium.

Adhere to the concentration (mixing ratio), temperature and cleaning time recommended by the cleaning agent manufacturer.

Tools with a basic body made of aluminium must be mechanically cleaned.

NOTICE

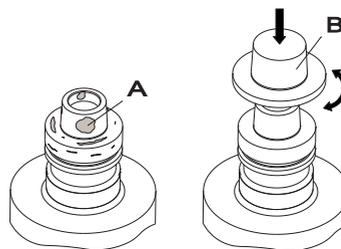
Danger of rupture of knives.

Do not clean mechanically knives of diamond.

5.1.7. Cleaning the receiving cone

Clamping devices with a cone require some specific cleaning work.

Check the tool interface daily for contamination and damage. The cone of the clamping device can be cleaned with a cleaning tool.



- A: HSK cone with impurities (e.g. shavings, dust or rust)
- B: Cleaning tool

Cleaning instructions:

1. Put the cleaning tool (B) over the cone.
2. Rotate the cleaning tool with slight pressure on the cone.
3. Remove cleaning tool.
4. Check whether the contamination has been removed.
5. If necessary, clean again.

WARNING

Danger of unstable tool in operation due to pollution. Injury or death due to stray components in operation.

Clean regularly the bearing surfaces on the tool cone.

Check and regularly clean the inner cone of the spindle according to specifications of the spindle or machine manufacturer.

Replace the clamping device immediately if defects appear such as dents, impressions or cracks.

5.1.8. Measurement

NOTICE

Danger of rupture of knives.

Knives of diamond to be measured only optical.

6. Preservation/Storage/Disposal

6.1. Preservation/Storage

If the tool or clamping adaptor is not being used for a longer period of time (> 6 months), it should be prepared for storage as follow:

- With the exception of fix screwed Hydro-clamping components, tool sets or tool combinations must be first dismantled into single tools.
- Clean well the single tools and clamping adaptors such as for example bushes, shafts, collets and chucks. For details, please refer to chapter "Cleaning" of the corresponding maintenance manual.
- For tools with inserted knives or reversible knives, all knife clamping systems must be dismantled and cleaned. Please refer to chapter "Cleaning" of the corresponding maintenance manual.
- Make sure that all clamping- and contact surfaces are free from dirt, oil, grease and water.
- For tools with inserted knives or reversible knives, the knives can now be re-mounted. Please refer therefore to chapter "Maintenance work" in the corresponding operating manual.
- Treat the dried single tools and clamping adaptors with a customary available preservation oil.
- Single tools and clamping adaptors may now be re-assembled.
- Store the conserved tools and clamping adaptors in a room, which is not exposed to large temperature fluctuations (20°C +/- 10°C).

NOTICE



Danger of corrosion by storing unconserved tools and clamping adaptors.

Always conserve tools and clamping adaptors, if not in use.

Do not put into operation tools and clamping adaptors with corroded screw connentions. Corroded screws must be replaced.

Threaded holes must be checked for accuracy as well as for strength.

6.2. Disposal

Dispose of tools and clamping devices in accordance with the local and national environmental regulations in your country.

Please take note of the disposal instructions of the cleaning agent manufacturer when disposing of the cleaning agent.

7. Accessories

Tool installation device as required by the taper of the tool shaft.

Holding bolt as required by the steep taper of the tool shaft.

8. Contacts/Addresses

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9. Glossary

9.1. Technical terms

Deflector

Protruding safety component that limits the clamping thickness.

Bore cutter (also bore tool)

A tool with a bore in the centre that is used to fasten the tool to the clamping device.

Pressure jaw

A clamping element that creates contact pressure to fasten a cutter to a tool.

Clamping eccentricity

Radial inaccuracy that results when a tool is clamped.

One-piece tools

Solid tools that are completely made of the same material.

Cutting circle diameter

Diameter range of the cutting edge and therefore largest outer diameter of the cutter.

Up-cut milling

During up-cut milling, the cutting movement of the tool proceeds against the relative advance movement of the work piece. The tool edge always enters the work piece by scraping and pressing.

Climb milling

Only suitable for mechanical advance. During climb milling, the cutting movement of the tool proceeds in the same direction as the relative advance movement of the work piece. The tool edge enters the work piece by cutting.

Helicoil

A Helicoil (brand name) is a wire thread insert for internal threads.

Cutter seat

Area in the support body that holds the cutters, which are fastened inside it by clamping elements.

Mean chip thickness

The mean chip thickness is the average thickness of a chip.

Resharpener

Sharpening the cutting edges of pre-used, blunt cutters.

Residual imbalance

Permitted imbalance range of the tool after balancing.

Recoil (also tool recoil)

Uncontrolled flinging away of the work piece or of work piece parts against the advance direction.

Shaft cutter

Single-part or compound tools that have cutters immediately next to the shaft (clamping area).

Grinding cracks

Grinding cracks are small micro-cracks that may occur during sharpening of cutters.

Cutter overhang

This is the radial distance between cutting edge and the circumference of the cutter body.

Cutter exchange

Replacement of blunted cutters with new cutters without complete removal of the tool.

Cutting speed

This is the speed at which the tool cutting edge moves in the cutting direction through

the material to be processed. The cutting speed is specified in metres per second.

SP-Technik or HPC/HPC+

Tools with SP-Technik or HPC/HPC+ are connected free of clearance on the clamping device. They form a functional unit which can be operated at much higher process parameters.

Chip breaker

This is a clamping element that is used between the pressure jaw and the cutter. A chip breaker ensures optimal chip breakage during the milling process.

Chip gap width

Tangential distance from the cutter edge to the deflector or circumference of the support body.

Clamping screw

The clamping screw (fastening element) produces the retaining force required by the pressure jaw to retain the cutter.

Service life

The service life is the duration that a tool can work without interruption until considerable signs of wear occur and the tool has to be replaced.

Support body

Basic body that carries the cutters.

Compound tools

Tipped tools that consist of a support body and firmly attached (not removable) cutters.

Precutter

Cutter part that can cut at the circumference as well as the front edge. It extends past the main cutter in a radial and possibly also in an axial direction.

Advance speed

Speed in meters per minute at which the tool processes the wood.

Exchangeable cutters

These are removable cutters that can be exchanged for new ones once they have reached the end of their service life.

Reversible cutters

These are cutters that can be reversed and can therefore be used several times.

Tool quality

Quality level of the tool.

Tool set

This is a combination of several individual tools that are jointly clamped onto one shaft or one bushing.

Tooth feed

Distance between two subsequent cutting surfaces in the advance direction.

Composite tool

Tool consisting of a support body, cutting edges and fastening elements that together form a unit.

9.2. Item numbering structure

An OERTLI item number has the following structure:

XX **XXXXXX** **XX**
⏟ ⏟ ⏟
A **B** **C**

9.2.1. A - prefix

The prefix always has two characters and includes the following abbreviations:

TA = Standard parts
TB = Standard parts
TE = Tool set (special tools)
TO = Individual tool (special tools)
TV = Various special parts

KC = Profile knife
KP = Profile knife
KX = Profile knife
KW = WIN knife
KG = Straight knife
KN = Groove knife
KF = Format knife
KR = Serrated knife

Example:
TA469720 = Standard part

9.2.2. B - number part

This is a 6 or 10 digit number between the prefix and the suffix and accurately identifies the item.

9.2.3. C - suffix

This suffix may contain the following information:

Cutter quality:

H8 = Standard hard-metal quality
H6 = Hard hard-metal quality
C01 = Coating Type 1
C02 = Coating Type 2
HS = High-alloy high-speed steel
HW = Hard metal
DP = Diamond

Only the H8 hard metal quality is an exception, as it is used as standard by the OERTLI company. Item numbers for hard metal quality H8 do not have a suffix.

Examples:

KP171300 = H8 (hard metal quality)
KP171300H6C02 = H6 with coating

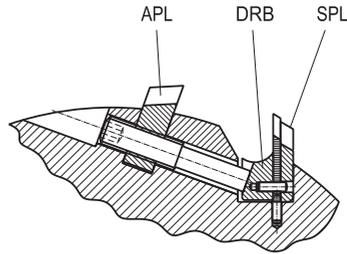
Profiled clamping parts:

Individual clamping parts carry their own marking when they are used in clamping systems for profiled clamping parts. This allows for easier identification of the individual clamping parts.

Description types:

APL = Deflector
PI/PA = Protect
SPL = Support plate
DRB = Profiled pressure jaw

Example:



KP171300 = Cutter
KP171300SPL = Support plate
KP171300DRB = Profiled pressure jaw
KP171300APL = Deflector

Shortened standard cutters:

Standard cutters that were individually shortened have the following suffix:

L + shortened length in millimetres

Example:

TA469720L195 (shortened to 195 mm)

9.3. Drawing numbers

The drawing numbers of the OERTLI company are structured like the following example:

TE 1511199 001 01 A
A B C D E

A: Drawing type (prefix)
B: Project number
C: Running number
D: Version number
E: Change index (alphabetically increasing)

9.4. Symbols



Use of damaged tools prohibited



Warning of rotating tool



Warning of cutting injuries



Warning of recoil



Warning of caustic substances



Read the operating instructions



Wear safety gloves



Wear protective goggles



Wear hearing protection



Wear safety shoes

9.5. Unit

9.5.1. Table of units

Parameter	Unity	Translation
Length	[mm]	x 0.03937 = [inch]
Length	[m]	x 39.370 = [inch]
Weight	[g]	x 0.035 = [oz]
Weight	[kg]	x 2.2046 = [lb]
Force	[N]	x 0.22481 = [lbf]
Force	[kN]	x 101.9716 = [kp]
Torque	[Nm]	x 0.738 = [lbf ft]
Pressure	[bar]	x 14.504 = [PSI]
Temperature	[°C]	(°C x 1.8) + 32 = [°F]
Rotation speed	[1/min]	---
Density	[kg/m ³]	---