

# Operating Instruction Manual

## Hydro-Locking 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 Hydro-locking chuck is a clamping component for shank tools. Inside the Hydro-locking chuck is a hydraulic, gas-free medium, which is enclosed in a small chamber around the bore. By operating the clamping mechanism, this medium is pressurized by a piston. The thin wall of the bore gives way to the pressure of the medium, thereby the bore compresses concentrically around the tool shank. Hence the tool is firmly fixed in the Hydro-clamping chuck.

### 1.1. Appropriate Application

The Hydro-clamping chuck serves as point of intersection between the spindle drive of the machine and the tool under consideration of suitable applications.

Tool shanks to be clamped:

- Cylindrical tool shanks
- Tool shank tolerances: Nominal diameter "h6"

Application and operation:

- Woodworking machines, mainly CNC-machining centres and Routing machines
- Max. speed: 24'000 RPM
- Minimum clamping length according to chapter "Min.clamping length" or "Optimum clamping length"
- Maximum tool weight according to chapter "Allowable tool weight for Hydro-clamping chuck"
- Maximum tool diameter according to chapter "Allowable tool diameter for Hydro-clamping chuck"
- Maximum projection length according to chapter "Allowable projection length for Hydro-clamping chuck"

### 1.2. Design variants

#### 1.2.1. Connection for spindle drive

The Hydro-clamping chuck is available with various spindle connections as follow:

- HSK-F 63 (Hollow Taper shank)
- SK 30 (Steep Taper shank)

- SK 40 (Steep Taper shank)

#### 1.2.2. Connection bore for shank tools

The Hydro-clamping chuck is available with various bores for shank tools as follow:

- Diameter 12 mm
- Diameter 16 mm
- Diameter 20 mm
- Diameter 25 mm

### 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 used for the purpose described under "appropriate use" and in compliance with the following safety instructions.

## 2.1. Signal words

### NOTICE

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

### ⚠ CAUTION

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

### ⚠ WARNING

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

### ⚠ DANGER

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

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

## 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

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



#### Safety shoes

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



#### Hearing protection

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



#### 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).



#### Protective goggles

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

## 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).

#### 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**

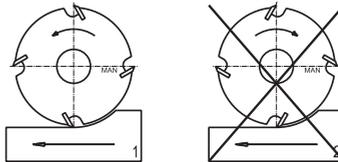


For manual feed exists danger of injuries, danger of crushing or danger of life by tool kick-back.

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:

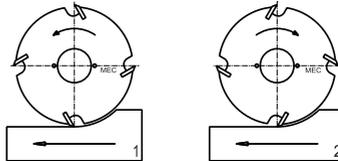


Marking MAN:

=> 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 ( $e_m$ ) of your clamping adaptor and compare the value with the inscription on the tool ( $e$ ). Use the clamping adaptor only, if " $e_m \leq e$ ". Consider thereby the procedure in chapter "Measuring the clamping eccentricity".

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

### 4.4.1. Min. clamping length for Hydro-locking chuck

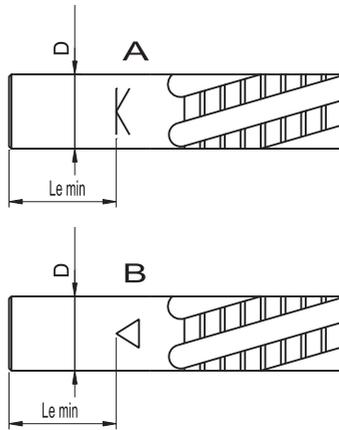
Attention! The minimum clamping lengths are not according to EN 847-2. They are longer!

## NOTICE

Damage of the clamping component due to over-strain in the area of the bore.

Use only fully cylindrical shanks.

Always mount the tool shank up to the stop of the connection bore of the clamping chuck.



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

### 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

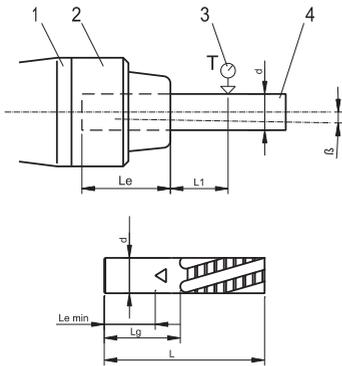
A measuring gauge is required to determine the eccentricity. It has to comply with the following requirements:

- 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**

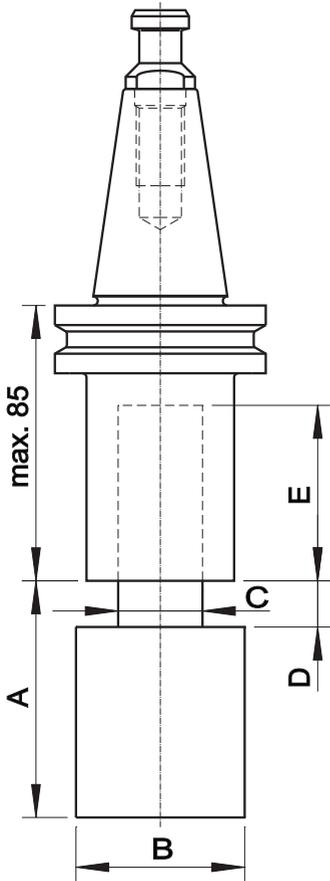
Rupture of tool or clamping device due to overload.  
Injury or death due to stray components in operation.

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 Hydro-locking chuck (SK 40)

Shank diameter, C [mm]	Max. tool weight [g]
12	300
16	1250
20	2500
25	3750

#### 4.5.2. Allowable tool diameter for Hydro-locking chuck (SK 40)

Shank diameter, C [mm]	Max. tool diameter, B [mm]
12	50
16	80
20	100
25	130

#### 4.5.3. Allowable projection length for Hydro-locking chuck (SK 40)

B [mm]	A [mm]			
	C [mm]			
	Ø12	Ø16	Ø20	Ø25
12	<b>55</b>			
16	51	<b>75</b>		
20	48	72	<b>90</b>	
25	44	70	87	<b>100</b>
30	40	67	85	98
35	36	64	83	96
40	32	62	81	94
45	28	59	79	92
50	25	56	76	90
55		53	74	88
60		51	72	86
65		48	70	84
70		45	68	82
75		43	65	80
80		40	63	79
85			61	77
90			59	75
95			57	73
100			55	71
105				69
110				67
115				65
120				63
125				61
130				60

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

#### 4.5.4. Allowable tool weight for Hydro-locking chuck (SK 30)

Shank diameter, C [mm]	Max. tool weight [g]
12	300
16	1250
20	1800
25	2650

#### 4.5.5. Allowable tool diameter for Hydro-locking chuck (SK 30)

Shank diameter, C [mm]	Max. tool diameter, B [mm]
12	50
16	80
20	100
25	130

#### 4.5.6. Allowable projection length for Hydro-locking chuck (SK 30)

B [mm]	A [mm]			
	C [mm]			
	Ø12	Ø16	Ø20	Ø25
12	<b>55</b>			
16	51	<b>75</b>		
20	48	72	<b>90</b>	
25	44	70	87	<b>100</b>
30	40	67	85	98
35	36	64	83	96
40	32	62	81	92
45	28	59	79	81
50	25	56	71	73
55		53	64	66
60		51	59	60
65		48	54	56
70		45	50	52
75		43	49	
80		40		51
85				
90			47	
95				50
100				
105				
110				
115				49
120				
125				
130				48

- 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 boundary 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

(see Fig. 1)

Consider unconditionally all given parameters and restrictions from the chapter "Application/Operation".

### *NOTICE*

Damage of the clamping component due to over-strain in the area of the bore.

Use only fully cylindric shanks.

Always mount the tool shank up to the stop of the connection bore of the clamping chuck.

### **⚠ 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.

Do not use clamping sleeves or reducing bushes.

Always clamp directly according to shank diameter of the tool.

1. Clean first clamping component and tool.
2. Operate the clamping mechanism (3) to open the Hydro-clamping chuck.
3. Remove the tool from the Hydro-clamping chuck (1).
4. Clean the Hydro-clamping chuck as well as the shank of the new to be installed tool. Make sure that all surfaces are free from dirt, oil, grease and water.

5. Check the shank diameter of the new tool and make sure that it corresponds to the tolerance parameter "h6".
6. Insert the shank of the new tool into the connecting bore (4) of the Hydro-clamping chuck. Be sure that the tool shank is mounted up to the stop of the connecting bore.
7. Operate the clamping mechanism to close the Hydro-clamping chuck.
8. Tighten the clamping mechanism with a suitable key up to the stop.
9. Make sure that the holding bolt (2) suitable for the steep taper shank is screwed into the foreseen hole of the Hydro-clamping chuck before the tool is mounted into the machine spindle.

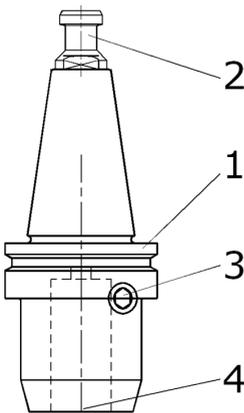
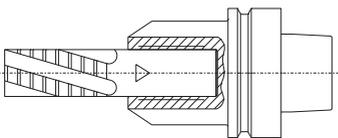


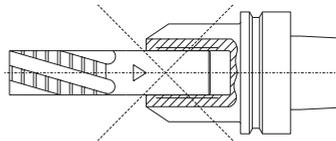
Fig. 1

### 5.1.2. Optimum clamping length of shank tools

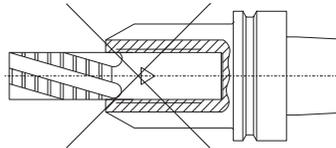
When clamping the shank tool be sure that the free shaft length is as short as possible.



Optimal clamping length



Minimum clamping length (not optimal)



Too deep clamping length (not permitted)

### 5.1.3. 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.

Holding bolt for steep taper shank M10 = 20 Nm

Holding bolt for steep taper shank M12 = 24 Nm

Holding bolt for steep taper shank M16 = 30 Nm

Clamping mechanism for Hydro-clamping chuck = on stop

#### 5.1.4. 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.

#### 5.1.5. 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**

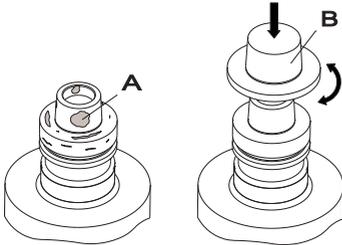
Danger of rupture of knives.

Do not clean mechanically knives of diamond.

### 5.1.6. 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.

### 5.1.7. 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 connections. 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 necessary for the taper cone of the tool shaft

Holding bolt as required for the steep taper cone of the tool shaft

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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

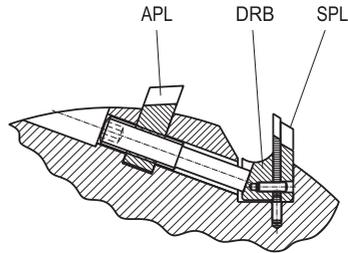
#### Profiled clamping parts:

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]

Parameter	Unity	Translation
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/m³]	---