

HILTI

HAT 28 Tester

Bedienungsanleitung

de

Operating instructions

en

Mode d'emploi

fr

Istruzioni d'uso

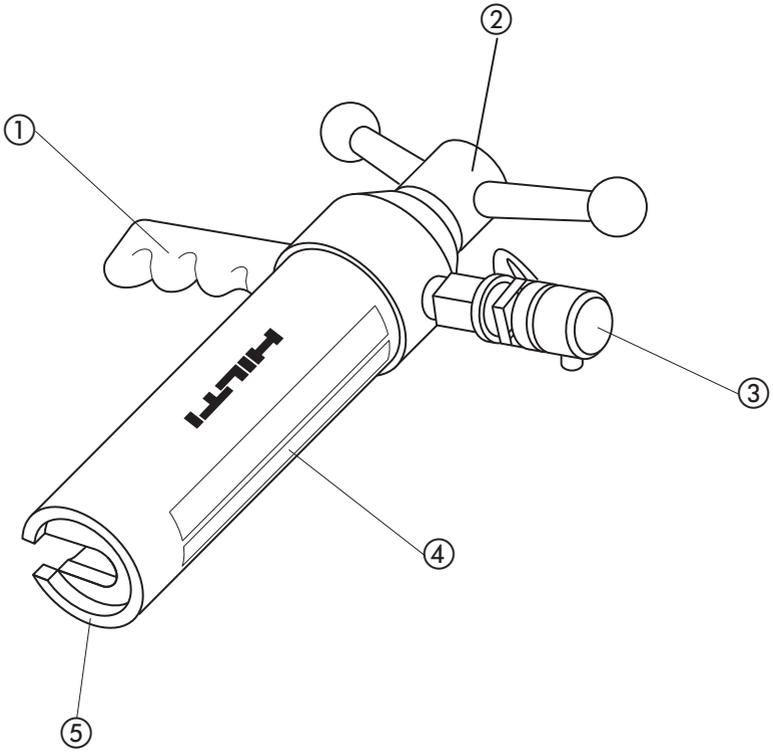
it

Manual de instrucciones

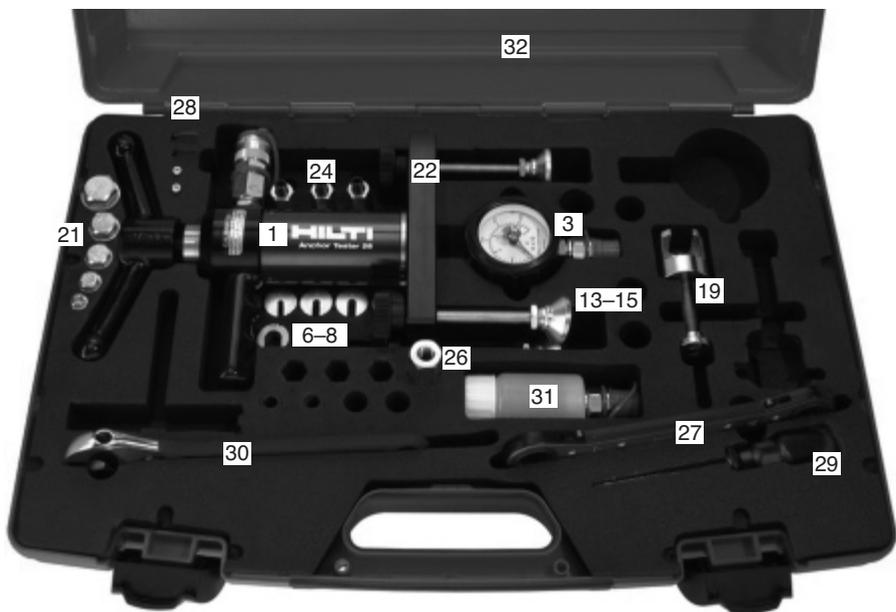
es

CE

A



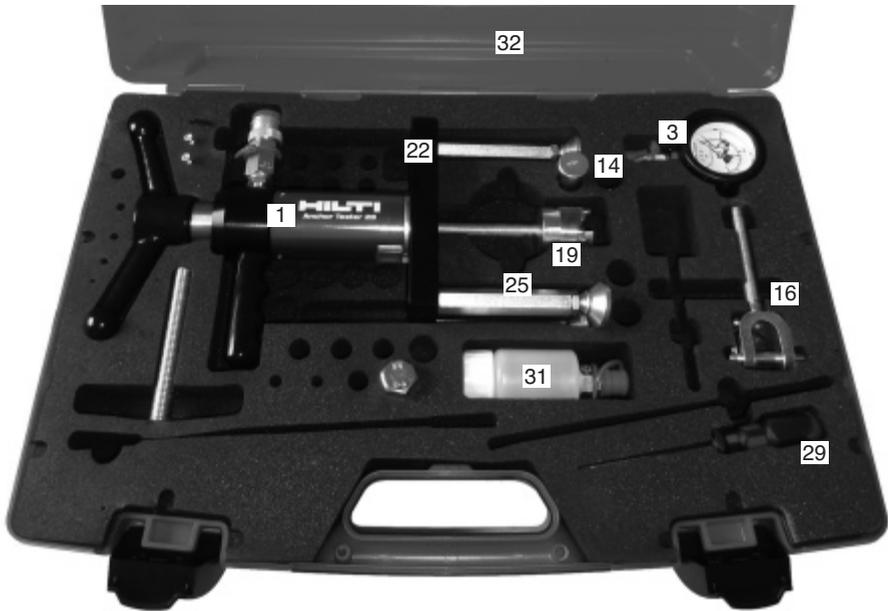
HAT 28 B



HAT 28 M



HAT 28 S



HAT 28 E



HAT 28 pull-out tester

It is essential that the operating instructions are read before the tool is operated for the first time

Always keep these operating instructions together with the tool.

Ensure that the operating instructions are with the tool when it is given to other persons.

Pull-out tester **A**

- ① Grip
- ② Crank
- ③ Coupling for removable gauge
- ④ Displacement indicator scale
- ⑤ Loading claw foot

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1. General information

1.1 Safety notices and their meaning

-CAUTION-

Draws attention to a potentially dangerous situation that could lead to minor personal injury or damage to the equipment or other property.

-NOTE-

Indicates instructions and other useful information.

1.2 Pictograms

Warning signs



General warning

Obligation signs



Wear eye protection



Wear a hard hat



Wear protective gloves

Symbols



Read the operating instructions before use



Return waste material for recycling

A Letters and numbers refer to the illustrations. The illustrations can be found on the fold-out cover pages. Keep these pages open while you read the operating instructions. In these operating instructions, the designation “the tool” always refers to the HAT 28 pull-out tester.

Location of identification data on the tool

The type designation and serial number are printed on the type plate on the tool. Make a note of this information in your operating instructions and always refer to it when making an enquiry to your Hilti representative or service department.

Type : _____

Serial no.: _____

2. Description

The HAT 28 pull-out tester is a purpose-made system for testing fastenings. It consists of a mechanical screw arrangement acting through a hydraulic load cell which measures the load applied to the fastener directly. The load value is then indicated by the strain gauge. The HAT 28 pull-out tester is supplied as an integral part of the HAT 28 "Basic", "Master", "Scaffold" and "Elevator" testing sets which are designed specifically for testing most small and medium-sized fastenings. A range of accessories is also available, thus further increasing the scope of possible testing applications (see Section 3.1, "Tools and accessories").

2.1 Use of the tool as directed

The tool is intended for use by skilled personnel with the appropriate training and knowledge of the applicable safety precautions.



- Modification of the tool, or tampering with its parts, is not permissible.
- To avoid the risk of injury, use only genuine Hilti fasteners, cartridges, accessories and spare parts or those of equivalent quality.
- Observe the information printed in the operating instructions applicable to operation, care and maintenance.

- The tool and its ancillary equipment may present hazards when used incorrectly by untrained personnel or not as directed.

3. Tools and accessories

3.1 Tools and accessories¹⁾

Tester kit	item number	HAT 28 B	HAT 28 M	HAT 28 S	HAT 28 E
1) Tensile tester HAT 28	-	355337	355338	355339	386372
2) Strain gauge 0-5 kN (1124 lbf)	285525	1	1	1	1
3) Strain gauge 0-20 kN (4497 lbf)	285528	1		1	
4) Strain gauge 0-25 kN (5620 lbf)	285529		1		
5) Strain gauge 0-30 kN (6744 lbf)	274311				1
6) Slotted button adapter set: 4.5, 5.5, 6.5, 8.5, 10.5, 12.5 mm	285546	1	1		1
7) Threaded button adapter set: 1/4", 5/16", 3/8", 1/2"	285549	1	1		
8) Threaded button adapter set: M4, M5, M6, M8, M10, M12	285543	1	1		
9) Threaded rod adapter M5	285553		1		
10) Threaded rod adapter M6	285555		1		
11) Threaded rod adapter M8	285556		1		
12) Threaded rod adapter M10	285557		1		1

3.1 Tools and accessories¹⁾ (continued)

Tester kit		HAT 28 B	HAT 28 M	HAT 28 S	HAT 28 E
	item number	355337	355338	355339	386372
13	Threaded stud adapter M12	285558	1		1
14	Threaded stud adapter M16	285559	1	1	1
15	Threaded stud adapter M20	285560	1		
16	Adapter for scaffold ringbolts	285551	1	1	
17	Adapter for ringbolts, large	2046528			1
18	Adapter for X-IE insulation fastener	285561	1	1 ²⁾	
19	Adapter piece (spacer)	285531	1	1	1
20	Locking adapter	2046529	1	1	1
21	Set of screws M6, M8, M10, M12, M16	285532		1	
22	Load distribution bridge 150 mm assy	285533	1	1	1
23	Load distribution bridge 250 mm assy	274313			1
24	Hexagon extension legs, 50 mm	285534	1	1	
25	Hexagon extension legs, 100 mm	285565		1	1
26	Operating nut, 22 mm AF	285524	1	1	1
27	Ratchet 22 mm AF	285536	1	1	1
28	Allen wrench set: 2.5 / 3 mm	285535	1	1	1
29	Ball driver 3 mm	2046527	1	1	1
30	Adjustable wrench 0-29 mm	285541	1	1	
31	Oil bottle 50 ml	285530	1 ²⁾	1 ²⁾	1 ²⁾
32	Toolbox, 595 x 392 x 142 mm	2029176	1	1	1
33	Toolbox, 397 x 362 x 110 mm	201899			1

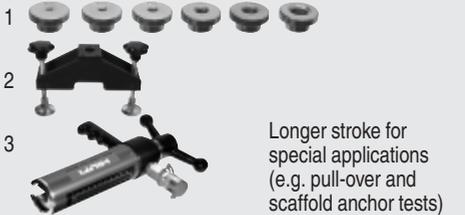
¹⁾ Subject to alterations

²⁾ optional; available as accessory

No.	Part	Item no.
HAT 28 DX Accessory Set		
1	Adapter for pull-over tests	285563
2	Adapter for X-ENP / ENP2 / ENP2H / NPH, complete	285564
3	Hexagon extension legs, 100 mm	285565
4	Open ended wrenches, 27 mm AF	285541

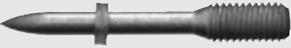


No.	Part	Item no.
Miscellaneous		
1	Gunitite test adapter set	285562
2	Load distribution bridge 385 mm assy	2023698
3	HAT 28 tensile tester 100 mm stroke	285570



Longer stroke for special applications (e.g. pull-over and scaffold anchor tests)

3.2 Examples of products that can be tested

Tester kit	HAT 28 B	HAT 28 M	HAT 28 S	HAT 28 E
Metal anchors				
 HST / HSA Kwik Bolts	✓	✓	✓ M16	✓ M10 - M16
 HKD / HDI Flush Anchors	✓	✓	✓ M16	
 HUS / KH Screw Anchors	✓	✓		✓ 12.5 mm
 HLC Sleeve anchors	✓	✓		
Adhesive Anchors				
 HVU + HAS	✓	✓		✓ M10 - M16
 HIT-HY / HIT-RE	✓	✓		✓ M10 - M16
 HIT-V	✓	✓		✓ M10 - M16
Plastic Anchors				
 HUD / HUD-L	✓	✓		
 HRD 8 / HRD 10 / HRD 14	✓	✓		
Scaffold System Anchors				
 GRS + GD		✓	✓	✓
 ST + HKD		✓	✓	✓
Threaded studs				
 X-BT	✓	✓		
 X-M / X-CRM (on concrete)	✓	✓		
 X-EM / X-CRM (on concrete)	✓	✓		

Examples of products that can be tested (continued)

Tester kit	HAT 28 B	HAT 28 M	HAT 28 S	HAT 28 E
Flathead nails				
 X-U / X-C (on concrete and steel)	with DX Accessories Set	with DX Accessories Set		
 X-CR (on concrete and steel)	with DX Accessories Set	with DX Accessories Set		
Decking nails				
 X-ENP / ENP2K	with DX Accessories Set	with DX Accessories Set		
Insulation fasteners				
 X-IE		✓		
Elevator hoist anchor points				
 HAP 1.15				✓

Suitable for following thread sizes:	M4 / M5 / M6 / M8 / M10 / M12 1/4", 5/16", 3/8", 1/2"	M4 / M5 / M6 / M8 / M10 / M12 / M16 / M20 1/4", 5/16", 3/8", 1/2"	M16	M10 / M12 / M16
Suitable for screws, flathead nails and other fasteners with following shank diameters:	4.5 / 5.5 / 6.5 / 8.5 / 10.5 / 12.5 mm	4.5 / 5.5 / 6.5 / 8.5 / 10.5 / 12.5 mm		12.5 mm
Pull out load range:	0-20 kN (4497 lbf)	0-5 kN (1124 lbf) 0-25 kN (5629 lbf)	0-20 kN (4497 lbf)	0-30 kN (6744 lbf)

4. Technical data

Tool ¹⁾	HAT 28 B	HAT 28 M	HAT 28 S	HAT 28 E
Pull-out load range	0-20 kN (4497 lbf)	0-5 kN / 0-25 kN (1124 lbf / 5629 lbf)	0-20 kN (4497 lbf)	0-30 kN (6744 lbf)
Maximum stroke	50 mm	50 mm	50 mm	50 mm
Stroke scale	mm	mm	mm	mm
Casing	aluminum	aluminum	aluminum	aluminum
Weight (w/o bridge assy)	2.5 kg	2.5 kg	2.5 kg	2.5 kg
Weight (with bridge assy)	4.0 kg	4.0 kg	4.0 kg	4.5 kg
Eff. span of load spreading bridge	118 mm	118 mm	118 mm	207 mm

Strain gauge	quick-release gauge	quick-release gauge	quick-release gauge	fixed gauge
Accuracy	± 2.5%	± 2.5%	± 2.5%	± 2.5%
Scale reading	kN / lbf	kN / lbf	kN / lbf	kN / kg
Accuracy	resetable maximum load pointer			
Maximum load indication	-40 to +60 C°			
Operating temperature ambient				
Protective rubber cover				
Viscous damped movement				
Built in protection against sudden load release				
Calibration certificate supplied with each strain gauge				

¹⁾ 1) with standard accessories included in the kit

5. Safety rules

5.1 Basic safety rules

All of these instructions must be read before using the tool and kept for future reference.

5.2 Precautions at the workplace



- Ensure that the working area is well lit.
- Keep the workplace tidy. Objects which could cause injury should be removed from the working area. Untidiness at the workplace can lead to accidents.
- Use the specified protective equipment. Wear protective glasses.
- It is recommended that non-slip shoes and rubber gloves are worn when working outdoors.
- Keep other persons, children in particular, away from the working area.
- Avoid unfavorable body positions. Work from a secure stance and stay in balance at all times.
- Do not work from a ladder.

5.3 General safety precautions



- Use only the genuine Hilti accessories or ancillary equipment listed in the operating instructions. Use of accessories or ancillary equipment other than the items listed in the operating instructions may present a risk of personal injury.

5.3.1 Mechanical hazards



- Observe the instructions concerning care and maintenance.

5.4 Requirements to be met by users

- The tool is designed for professional use.
- The tool may be operated, serviced and repaired only by authorized, trained personnel. This personnel must be informed of any special hazards that may be encountered.
- Always concentrate on your work. Proceed carefully and do not use the tool if your full attention is not on the job.

6. Operation



6.1 Basic testing procedure

6.1.1 The testing procedure for standard situations

1. Fit the appropriate adapter to the fastener to be tested.
2. Slide the slot in the cylindrical section of the spacer over the adapter until the fastener axis and spacer axis are in alignment. (see paragraph 6.1.2)

3. If necessary, adjust the length of the threaded legs until the head of the spacer can be passed through the opening in the load distribution bridge. Check that the head of the spacer is centered in the tester.
4. Position the tester so that the gauge can be read conveniently.
5. Adjust the length of the threaded legs so that all three are in contact with the base material). Check that the pull-out force acts in the fastener axis and parallel to the threaded legs.

-CAUTION-

Any significant misalignment at this stage will result in the threaded legs bending as the test proceeds.

6. Set the red pointer of the strain gauge to zero. Hold the tester by the grip while increasing the load on the fastener by turning the crank in a clockwise direction.

-CAUTION-

Hold the tester securely by the grip as long as the fastener is under load. As the load on the fastener increases, note the reading on the displacement scale on the tester. Indication of failure of the fastener may be obtained by comparing the current reading on the displacement scale with the original reading.

7. Increase the load until the minimum specified load is attained.
8. Release the load on the fastener by turning the crank counter-clockwise and pushing it down until the original position is reached.
9. Remove the tester and the adapter.

6.1.2 Using the spacer

The spacer is used either with threaded or slotted button adapters or, without an adaptor, for testing fasteners with a diameter of 16 mm diameter.

It consists of a cylindrical section with a loading claw foot cut-out and an M12 threaded rod to which an M12 threaded adapter or a locking adapter can be attached. The threaded or slotted adapter for the fastener to be tested fits into a slot in the claw foot of the spacer. Then proceed as described in paragraph 6.1.1

One of the load distribution bridges or the load distribution tripod is required for all applications using the spacer.

6.1.3 Using the threaded button adapters

(M4, M5, M6, M8, M10, M12) 

- For testing threaded fasteners (e.g. stud anchors or threaded DX stud fasteners).
- Screw the threaded button adapter on the projecting thread and proceed as described in paragraph 6.1.1

-NOTE-

An M16 nut or bolt head will usually fit straight into the loading claw foot without the need for a threaded button adapter. In exceptional cases (e.g. X-CRM fastener on steel), the tester can be used with the M4, M5, M6, M8, M10 or M12 threaded button adapters without the spacer or load spreading bridge.

Remove the test meter from the bridge by undoing the 3mm socket screws holding the meter on the bridge.

Screw the adapter onto the protruding thread of the fixing and slide the loading claw foot of the test meter under the flange of the threaded button adapter. Then proceed as described in paragraph 6.1.1

If the length of thread protruding is sufficient, the fastener may be loaded without first removing the component fastened. In this case, however, the load applied to the fastener by the component (e.g. its own weight) must also be taken into account as this load, in addition to the load applied by

the pull-out tester, also acts on the fastener and increases the probability of failure.

When fitting the adapter, check that a secure connection is made between the adapter and the threaded stud anchor.

6.1.4 Using the slotted button adapter

(4.5, 5.5, 6.5, 8.5, 10.5, 12.5 mm) 

- For testing fasteners where a connection is made to the head of the bolt or anchor (e.g. a hex head such as HUSH or HRD, or a round/countersunk head, such as HLC-SK or HRD-X).

-NOTE-

The 6 slotted button adapters are suitable for testing fastenings within the 4 to 12 mm diameter range.

These adapters are fitted under the head of the bolt or anchor in place of the item usually fastened.

Slide the loading claw foot of the spacer or the test meter under the flange of the slotted button adaptor then proceed as described in paragraph 6.1.1

-ATTENTION-

Take care to ensure that the adapter is not damaged by tightening the fixing onto the adapter against an uneven concrete surface and distorting the adapter. We strongly recommend placing a large washer or steel plate between the adapter and the concrete surface.

6.1.5 Use of the threaded rod adapters

(M5, M6, M8, M10) 

The M5 and M6 threaded rod adapters are equipped with an external M12 thread for use in conjunction with the M12 threaded rod adapter. They are used primarily for testing remedial wall ties.

The M8 and M10 threaded rod adapters are equipped with an external M16 thread and can be used with a normal M16 nut without any additional adapter.

1. Connect the threaded rod adapter complete with the M12 threaded button adapter to the end of the fixing, for a mechanical remedial wall tie, take care to avoid further tightening of the outer leaf expansion nut.
2. If necessary, adjust the length of the threaded legs and the height of the button adapter / nut so that the adapter can be passed through the hole in the load distribution bridge fitted to the tester and into the loading claw foot. Whilst doing so, check that the adapter is centered in the tester.
3. Adjust the threaded legs to minimize any play between the adapter and the tester and ensure that the pull-out force acts along the axis of the fixing being tested.

-CAUTION-

Do not over tighten the legs.

4. Proceed as described in paragraph 6.1.1

6.1.6 Using the threaded stud adapters

(M12, M16, M20) 

- Suitable for testing externally and internally threaded anchors (e.g. stud anchors or flush anchors).

Externally threaded anchors:

1. Connect the threaded rod adapter to the fixing.
2. If necessary, adjust the length of the threaded legs so that the adapter can be passed through the hole in the load distribution bridge fitted to the tester and into the loading claw foot. Whilst doing so, check that the adapter is centred in the tester.
3. Adjust the threaded legs to minimize any play between the adapter and the tester and ensure that the pull-out force acts along the axis of the fixing being tested.

-CAUTION-

Do not over tighten the legs

4. Proceed as described in paragraph 6.1.1

Internally threaded anchors: After the anchor has been set in accordance with the applicable instructions, a suitable threaded rod is screwed into the anchor and the adaptor then screwed onto this. The length of threaded rod to be screwed into the anchor and the adapter must be at least equal to the diameter of the anchor. Then proceed as above for externally threaded anchors.

6.1.7 Using the X-IE adapter

1. Remove the insulation around the insulation fastener.
2. Slide the head of the insulation fastener between the two plates of the X-IE adapter with the stem of the fixing resting in the slot in the lower plate
3. If necessary, adjust the length of the threaded legs so that the adapter can be passed through the hole in the load distribution bridge fitted to the tester and into the loading claw foot. Whilst doing so, check that the adapter is centred in the tester.
4. Adjust the threaded legs to minimize any play between the adapter and the tester and ensure that the pull-out force acts along the axis of the fixing being tested.

-CAUTION-

Do not over tighten the legs

- a. Proceed as described in paragraph 6.1.1

6.1.8 Using the operating nut (22 mm AF)

This nut can be used with a 22 mm ratchet (supplied in the sets) for better access in confined spaces and for easier operation.

1. Unscrew and remove the standard crank. Take care not to misplace the underlying washer and bearing.
2. Screw on the operating nut in place of the crank.

6.2 Testing scaffold anchors

6.2.1 Basic setup for testing scaffold anchors

(only applies to Master Kit - Scaffold Kit is already set up by default)

1. Remove the swiveling feet from the threaded legs on the load spreading bridge.
2. Screw the 100 mm hexagon extension legs (hand tight) onto the threaded legs so that the end of the hexagonal section is in contact with the load distribution bridge.
3. Screw the swiveling feet onto the ends of the 100mm hexagon extension legs.
4. Check that the ring in the center of the chain securing the pin is attached to the ringbolt adapter and then screw on either the the M12 threaded rod adapter or the M12 locking adapter so that full thread engagement is achieved and fit it into the loading claw foot in the tester.
5. If the surface of the base material is uneven fine adjustment must be carried out before performing the test.

6.2.2 Using the adapter for scaffold anchor tests

1. Withdraw the pin, place the adaptor over the head of the ring bolt and then replace the pin, passing it through the ring.
2. If the surface of the base material is uneven, fine adjustment must be carried out before performing the test.
3. Proceed as described in paragraph 6.1.1

-CAUTION-

Any significant misalignment at this stage will result in the threaded legs bending as the test proceeds.

7. Care and maintenance

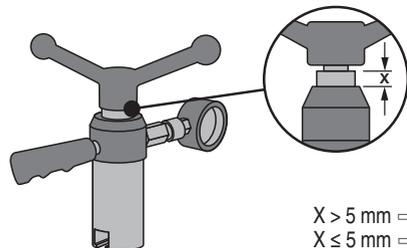
7.1 Care of metal parts

Remove any dirt adhering to parts and wipe the surfaces of the tool from time to time with a damp cloth.

7.2 Refilling with oil

(only testers with quick-release gauge)

Frequent removal and reconnection of the gauge will cause the oil reservoir level to drop and will eventually affect the amount of oil available to operate the gauge. When this happens, the oil piston between the operating handle and black tester body will have retracted within the body. In this case it is recommended to send the tester to a Hilti repair center for refilling oil and overhauling the tester.



$X > 5 \text{ mm} \Rightarrow \text{o.k.}$
 $X \leq 5 \text{ mm} \Rightarrow \text{refill oil}$

8. Disposal



Most of the materials from which Hilti tools are manufactured can be recycled. The materials must be correctly separated before they can be recycled. In many countries, Hilti has already made arrangements for taking back your old tools for recycling. Please ask your Hilti customer service department or Hilti representative for further information. Should you wish to return the tool yourself to a disposal facility for recycling, proceed as follows: Dismantle the tool as far as possible without the need for special equipment. Use absorbent paper to wipe oily parts clean and to collect any oil that runs out. This paper must also be disposed of correctly. **On no account should oil be allowed to enter the waste water system or to find its way into the ground.**

Part / assembly	Main material	Recycling
Toolbox	Plastic	Plastics recycling
Strain gauge	Plastic / steel	
Adapter	Steel	Scrap metal
Spacer	Steel	Scrap metal
Load distribution bridge	Steel	Scrap metal
Screws, small parts	Steel	Scrap metal
Oil	Oil	Used oil disposal point

9. Warranty

Hilti warrants that the product supplied is free of defects in material and workmanship. This warranty is valid as long as the product is operated and handled correctly, cleaned and serviced properly and in accordance with the Hilti operating instructions, all warranty claims are made within 12 months (unless other mandatory national regulations prescribe a longer minimum period) from the date of sale (invoice date) and the technical system is maintained, i.e. only original Hilti consumables, accessories and spare parts are used with the product.

This warranty provides the free-of-charge repair or replacement of defective parts only. Parts requiring repair or replacement as a result of normal wear and tear are not covered by this warranty.

Additional claims are excluded, unless mandatory national regulations prohibit such exclusion. In particular, Hilti is not obligated for direct, indirect, incidental or consequential

damages, losses or expenses in connection with, or by reason of, the use of, or inability to use the product for any purpose. Implied warranties of merchantability or fitness for a particular purpose are specifically excluded.

Send the product and/or related parts immediately upon discovery of a defect to the local Hilti marketing organization for repair or replacement.

This constitutes Hilti's entire obligation with regard to warranty and supersedes all prior or contemporaneous comments and oral or written agreements concerning warranties

10. EC declaration of conformity

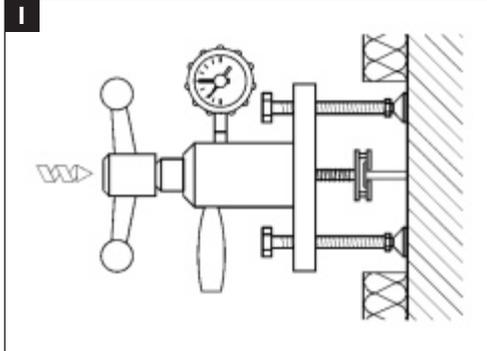
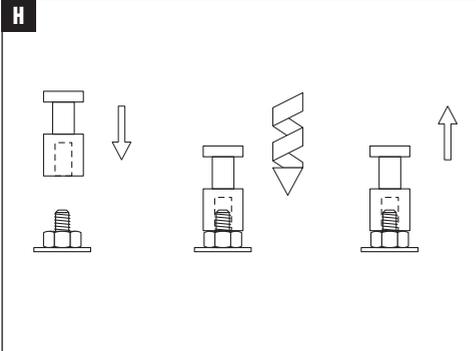
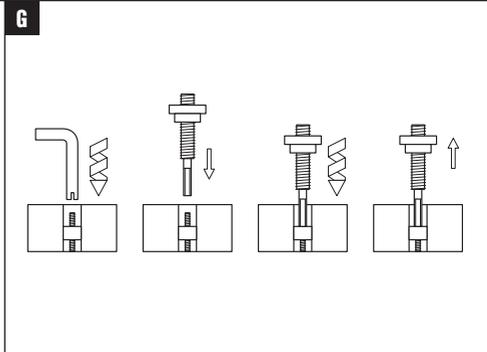
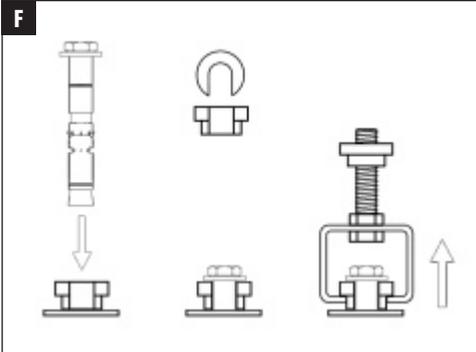
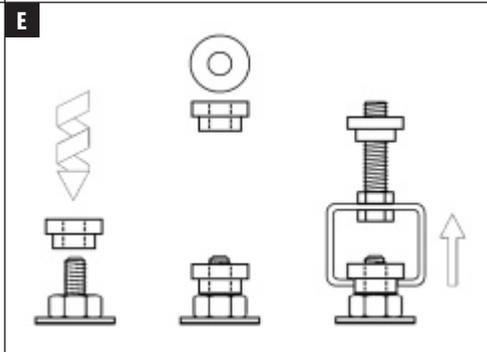
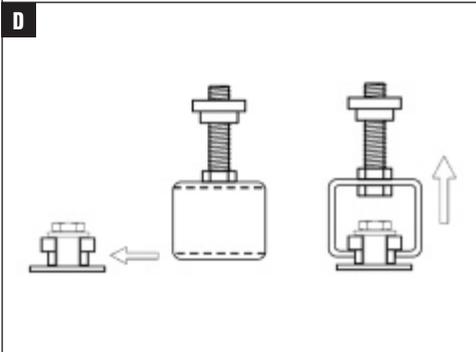
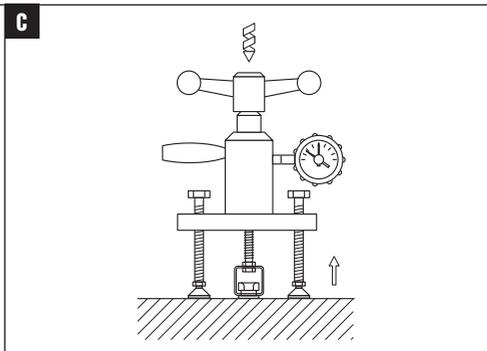
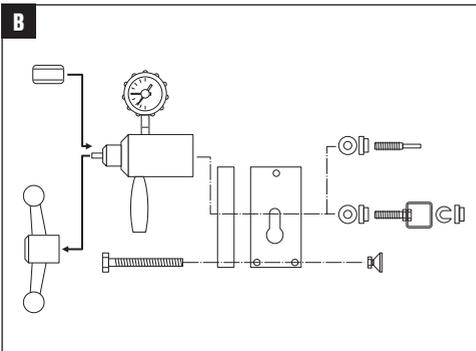
Designation:	Pull-out tester
Type:	HAT 28
Year of design:	2004

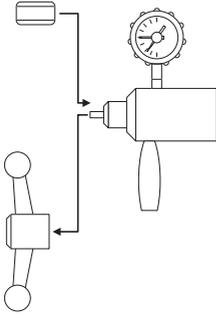
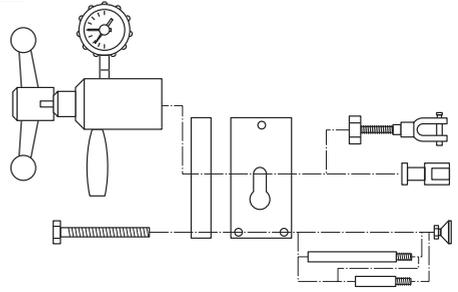
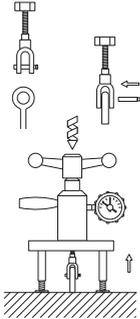
We declare, on our sole responsibility, that this product complies with the following directives or standards: 98/37/EC.

Hilti Corporation

Raimund Zagg
Senior Vice President
Business Area Direct Fastening
09 / 2004

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J**K****L**



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