

DS	0191	Iss	11
----	------	-----	----

Scaffolding Products

ST 127 Ringbolt



Ring inside diameter (approx. 52mm) accepts scaffold tube.
Fits HKD anchors (For tensile loads only), HIS resin sockets and MFP-GP16 base plates
Stamped with "1270 Kgs MAX"

ST 127 ringbolt 00058253

Knock-in anchor



Shallow embedment depth anchor for use in "uncracked" mass concrete
It may work in other base materials but must be proved by site test and will probably require the capacity of the ties to be reduced leading to a consequential increase in the number of ties.
Note the minimum edge distances required.

HKV M16 x 65 socket 00384973

MFP-GP16 base plate, HUS H10x90/5/20/30, and ST 127 Ringbolt



These can be used when close edge distances rule out the use of the "knock-in anchor" and also they can be used in suitable brickwork however due to the variability of masonry the capacity of the connection must be proved by test.

MFP-GP16 base plate 00373203

HUS H10x90/5/20/30 00401439

ST 127 Ringbolt 00058253

Rapid Scaffold system

GD 14 + GRS 12 Scaffolding anchor



These form a Light duty scaffold tie for use with hooks,

Scaffold Screw		Anchor body	
GRS 12 / 90	00056418	GD 14 / 70	00045454
GRS 12 / 120	00056419	GD 14 / 100	00045455
GRS 12 / 160	00056420	GD 14 / 135	00045456
GRS 12 / 190	00056421		
GRS 12 / 230	00056422	Blanking plug	
GRS 12 / 350	00056423	VST 14	00056440

19-11-88	Complied: MFW	Approved:	Revised: RBL Feb 2013	
----------	---------------	-----------	-----------------------	--

DS	0191	Iss	10
----	------	-----	----

Test Equipment



Hilti supply a number of different test meter kits, the Scaffold Tester Kit may be used to confirm the suitability of the fixing for the base material the scaffolding is being attached to and also be used for routine proof load testing.

HAT 28 Scaffold Tester Kit with fixed 20 kN gauge 321481

Scaffolding Restraint Requirements

Arrangement of ties

The Construction Fixings Association give details in their Guidance Note “*Anchorage Systems for Scaffolding: NASC TG4:11*” about the requirements for scaffolding restraints.

Detailed instructions on the required number of ties and their spacing can be found in **BS EN 12811- Part 1: Scaffolds**

The BS standard gives rules on the minimum number of ties per unit area (table 1a) but states that more ties may be required depending on,

- scaffold height
- sheeting
- strength of base material
- actual tie load capacity

Reference is made to “manufacturer’s recommendations”. This data sheet gives load data and installation instructions for Hilti Scaffolding Products.

Caution:- Details of tie number of ties per unit area and spacing can be found in NASC document “*TG20 – Guide to good practice for scaffolding with tubes and fittings*” but the required load capacity may not be achievable from the fixings discussed here depending on the base material to which the scaffold is being attached in which case additional ties may be required.

Ties
ST 127 Ringbolt

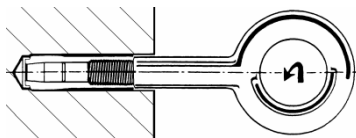


Normally, scaffold ringbolts should be arranged to resist only tensile (pull-out) or compressive loads. Under these loads the ST127 has a safe working tensile load of 1270 KGS (marked on the ring). Even a relatively low lateral loading will cause bending of the ringbolt. Therefore, these ringbolts should not be subjected to lateral loads. However, in response to enquiries, we have tested the ST127 with the load applied by a scaffold tube through the eye of the ringbolt and can advise safe working loads as,

- or Pure Tensile Resistance, $N_{rec} = 12.6\text{kN}$
- or Pure Lateral Resistance, $V_{rec} = 0.7\text{kN}$
- or Combined load, Max Tensile Resistance $N_{rec} = 6.25\text{kN}$ with Max Lateral Resistance, $V_{rec} = 0.5\text{kN}$

IMPORTANT : The resistance of the anchor may be less than that of the ringbolt. Always use the worst-case values. The ST127 Ringbolt is only recommended for scaffold restraint and must not be used for lifting or fall arrest applications. The ST127 Ringbolt may be used with any fixing with a mating M16 course thread which is able to achieve the required performance.

Tie assembly
HKV M16x65 + ST 127 ringbolt



Fix into structural Concrete.
The anchor is not removable from the concrete.

The HKV anchor is suitable for fixing into structural concrete. Anchor installation must follow the relevant Method Statement. Providing that the following conditions are met, the safe working loads given below can be used.

			HKV M16x65
Recommended tensile load	N_{rec}	kN	12.6
Factor of safety included.	γ_F	-	1.4
Minimum hole depth in concrete	h_{nom}	mm	70
Minimum spacing to nearest anchor	s_{min}	mm	195
Minimum distance from edge	c_{min}	mm	230
Minimum concrete thickness	h	mm	130
Concrete compressive strength range	f_{ck}	N/mm^2	25-60

These systems **MAY ONLY BE USED** if

- The base material has sufficient strength to provide a suitable fixing
- The base material dimensions are sufficient to accommodate the anchor
- The structure itself is capable of sustaining the loads applied
- The restraints are **NOT** intended to be a permanent tie system

Under any other conditions, the load capacity may be reduced – contact Hilti for guidance.

Embedment

The data given above under “Anchors” applies if the anchor is embedded in structural concrete. Any surface covering (Render, cladding, insulation etc) is not considered structural unless proven otherwise. If a non-structural covering exists, the hole depth must be increased accordingly.

Other Base Materials

Note: According to the requirements of NASC-TG4:11 HKV anchors may not be used in brickwork or other forms of masonry.

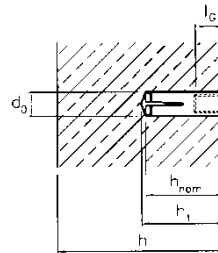
Corrosion / Staining

If the HKV is left exposed, it is likely to corrode and may stain or damage the building façade.

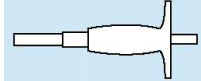
Installation

Equipment

- TE Drilling machine
- 20 diameter drill bit
- Blow-out pump
- HSD-G M16 setting punch
- Club Hammer
- HKV M16x65 anchors
- ST127 ringbolts



Setting Equipment for above



HSD-G M16 Manual setting punch for expanding HKV M16x65 00243744

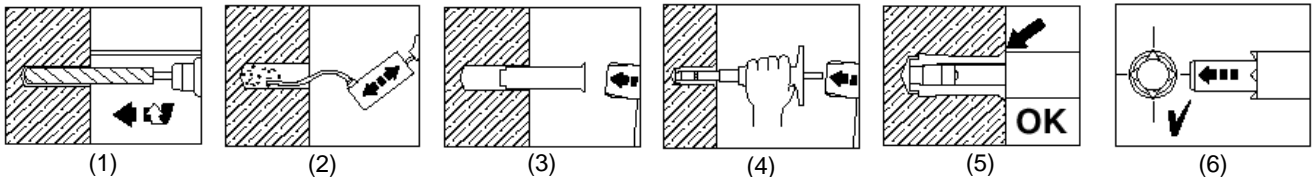
HSD-M16 Machine insert setting tool 00243753

Setting details

Drill bit diameter	d_0	(mm)	20
Embedment depth (min)	h_{nom}	(mm)	65
Hole depth	h_1	(mm)	70
Effective thread length	l_G	(mm)	23
Base material thickness (min)	h	(mm)	140

Anchor Installation Instructions

1. The person responsible for the scaffolding design must determine the tie locations, embedment depths of the fixings and the test loads required.
2. Drill a 20mm diameter hole to the required depth, h_1 , (see table) into the **structural** base material (Step 1)
3. Thoroughly clean all dust and debris from the hole using a blow-out pump. (Step 2)
4. Place the anchor into the hole. Use a hammer to tap it in flush with the surface. If the anchor is to be embedded below the surface, use the larger diameter end of the HSD-G M16 setting punch to tap the anchor into the bottom of the hole. (Steps 3, 4)
5. Insert the smaller diameter end of the HSD-G M16 punch into the anchor.
6. Taking care not to damage the threads, strike the punch thereby driving down the expansion plug. The expansion is complete when the mark appears and the sound from the impacts changes to a ringing tone. (Steps 5, 6)



ALWAYS

- Use the correct diameter drill bit
- Clean the hole thoroughly
- Use the correct setting punch
- Drive punch until tone changes

Ringbolt Installation Instructions

1. Screw the ringbolt into the anchor a minimum of 8 full turns. The end of the ringbolt must not touch the bottom of the anchor.
2. The ringbolt should be turned back a maximum of 1 turn (rather than forward) to align the ring with the scaffold tube.
3. **DO NOT** over-tighten the ringbolt.
4. **DO NOT** use a scaffold tube or a podger to tighten the ringbolt.

Tie assembly MFP-GP16 base plate + HUS-H Screw anchor + ST127 ringbolt

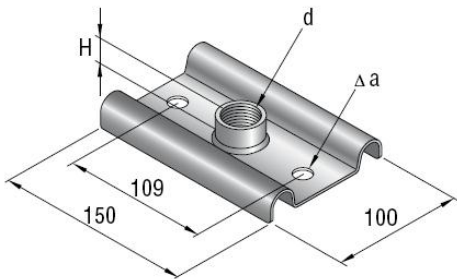


Recommended load data for assembly, 30N/mm² concrete, and minimum edge distances above and below fixings.

	Edge distance (mm)	“Cracked” concrete (kN)	“Uncracked” concrete (kN)
No edges	>125	9.9	13.0
One edge	125	9.9	13.0
	100	9.8	13.0
	75	8.0	11.2
Two edges (e.g. slab edge fixing)	125	9.9	13.0
	100	9.8	13.0
	75	6.84	9.60

Tensile loads only, Check other cases with Profis Anchor design software, and $\gamma_F = 1.6$

MFP-GP16 base plate



$\Delta_a = 20\text{mm}$

$d = M16$

$H = 20\text{mm}$

$F_{rec\ tensile} = 20.0\text{kN}$

$F_{rec\ shear} = 2.0\text{kN}$ ($A = 150\text{mm}$)

(Exceeds capacity of ST127 Ring bolt)

Check the capacity of the pair of anchors for the particular location and base material encountered.

Other fixings may also be used with this base plate depending on their suitability for the particular base material and the required load capacity.

HUS-H Screw anchor



Anchor version Benefits

- | | |
|--------------|---|
| HUS-H | - Quick and easy setting |
| Carbon steel | - Low expansion forces in base materials |
| Concrete | - Through fastening |
| Screw | - Removable |
| | - Forged-on washer and hexagon head with no protruding thread |

Basic loading data for C20/25 concrete

Anchor size		10	10
h_{nom}	[mm]	70	85
Tensile $N_{rec}^{a)}$	[kN]	4.8	6,8
Shear $V_{rec}^{a)}$	[kN]	11.3	11,3
Tensile $N_{rec}^{a)}$	[kN]	3.0	5,4
Shear $V_{rec}^{a)}$	[kN]	11.3	11,3

a) With overall partial safety factor for action $\gamma = 1.4$. The partial safety factors for action depend on the type of loading and shall be taken from national regulations. According ETAG 001, annex C, the partial safety factor is $\gamma_G = 1.35$ for permanent actions and $\gamma_Q = 1.5$ for variable actions.

ETA: Data according ETA-08/0307 issue 2009-03-30

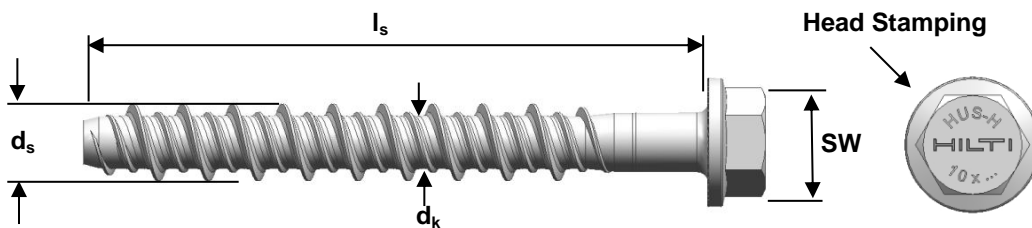
Recommended load for a single anchor

DS	0191	Iss	10
----	------	-----	----

Anchor size			HUS-H 10
Nominal embedment depth	h_{nom}	[mm]	70 or 85
Minimum base material thickness non-cracked concrete	h_{min}	[mm]	130
Minimum spacing concrete	s_{min}	[mm]	65
Minimum edge distance concrete	c_{min}	[mm]	65
Minimum base material thickness cracked concrete	h_{min}	[mm]	130

Setting Equipment

Anchor size	HUS-H 10
Rotary hammer	TE 6 ... TE 16
drill bit	TE-C3X 10/22
Socket wrench insert	S-NSD 15 1/2" (L)
Impact screw driver	SI 100

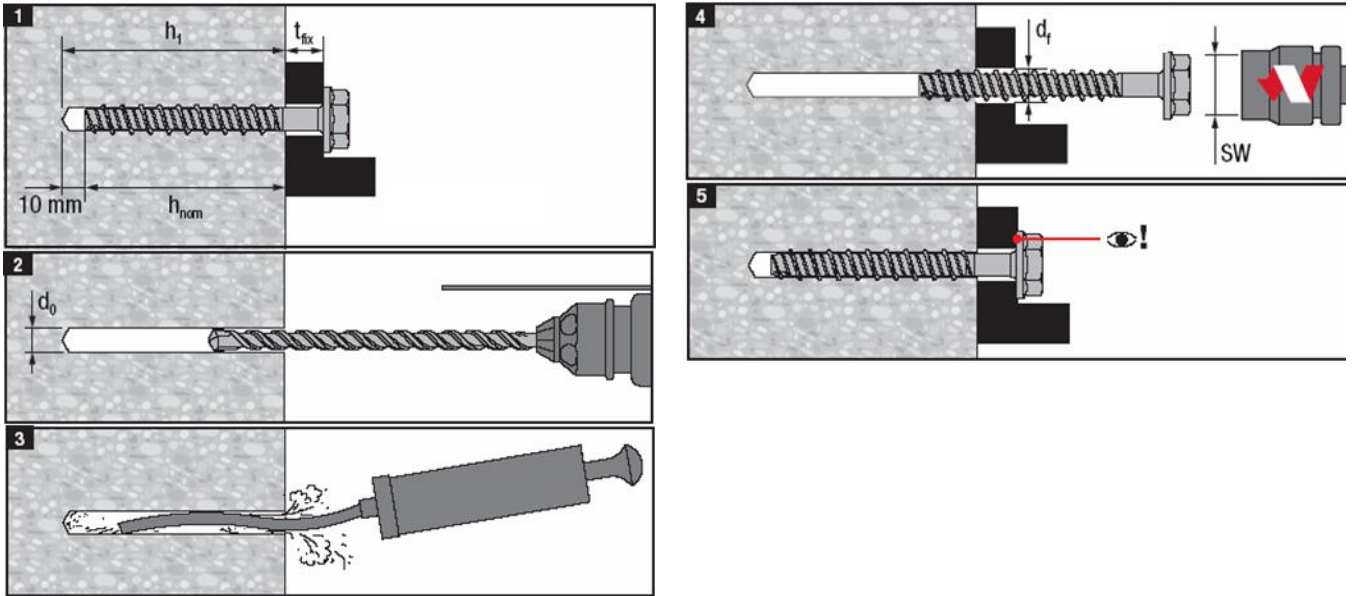


Setting details

Anchor version	HUS-H	10x90	
Nominal embedment depth	h_{nom}	[mm]	85
Nominal diameter of drill bit	d_o	[mm]	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10,45
Depth of drill hole	$h_1 \geq$	[mm]	95
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	14
Effective anchorage depth	h_{ef}	[mm]	67
Max. fastening thickness	t_{fix}	[mm]	$l_s - h_{nom}$
Max. installation torque Concrete	T_{inst}	[Nm]	55

a) Installation torque for manual setting only. Machine setting not required.

Setting instruction



For detailed information on installation see instruction for use given with the package of the product.

1. The person responsible for the scaffolding design must determine the tie locations, embedment depths of the fixings and the test loads required.
2. Drill a 10mm diameter hole to the required depth, h_1 , (see table) into the **structural** base material (Step 2)
3. Thoroughly clean all dust and debris from the hole using a blow-out pump. (Step 3)
4. Drive the HUS screw through the MFP-GP 16 base plate using the appropriate impact screwdriver and socket (step 4).
5. Install the other HUS into a hole drilled through the other slot in the base plate.
6. Check both screws are bearing properly on the MFP-GP 16 base plate (step 5)

Ringbolt Installation Instructions

1. Screw the ringbolt into the anchor a minimum of 8 full turns. The end of the ringbolt must not touch the bottom of the socket .
2. The ringbolt should be turned back a maximum of 1 turn (rather than forward) to align the ring with the scaffold tube.
3. **DO NOT** over-tighten the ringbolt.
4. **DO NOT** use a scaffold tube to tighten the ringbolt.

GD 14 + GRS 12 Scaffolding anchor for concrete



GD 14 Plug

GRS 12 Scaffold screw

Various lengths of Plug and scaffold screw are available to suit specific requirements.

Basic loading data (for a single anchor)

All data in this section applies to

- Correct setting (See setting instruction)
- Load data are only valid for the specified screw
- No edge distance and spacing influence
- Base material as specified in the table

Note: NASC TG20 "Guide to good practice for scaffolding with tubes and fittings" specifies a requirement for light duty ties of 3.5 kN recommended load – In order to use these fixings increase the number of ties proportionately.

Recommended loads

Anchor size		GD 14					
	Screw type	GDS 12x90	GDS 12x120	GDS 12x160	GDS 12x190	GDS 12x230	GDS 12x350
Concrete ≥ C16/20	N _{rec} [kN]	2,8					
	V _{rec} [kN]	1,8	1,7	0,65	0,4	0,23	0,09
Solid clay brick Mz 12-2.0	N _{rec} [kN]	1,3					
	V _{rec} [kN]	0,65	0,65	0,65	0,4	0,23	0,09
Solid sand-lime brick KS 12-2.0	N _{rec} [kN]	0,85					
	V _{rec} [kN]	0,5	0,5	0,5	0,4	0,23	0,09

- With partial safety factor $\gamma_M = 1,8$ for concrete and $\gamma_M = 2,5$ for masonry (acc. ETAG 020)
- With partial safety factor $\gamma_F = 1,5$ for the loading (acc. EN 12811-1)
- Shear load data are determined from the lower value of anchor load capacity in the base material and the serviceability load that ensures a maximum bending of the screw of 1/50 of its lever arm.

Service temperature range

Hilti GD 14 scaffolding anchor may be applied in the temperature range given below.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range	-40 °C to +80 °C	+50 °C	+80 °C

Max short term base material temperature

Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Max long term base material temperature

Long-term elevated base material temperatures are roughly constant over significant periods of time.
Material

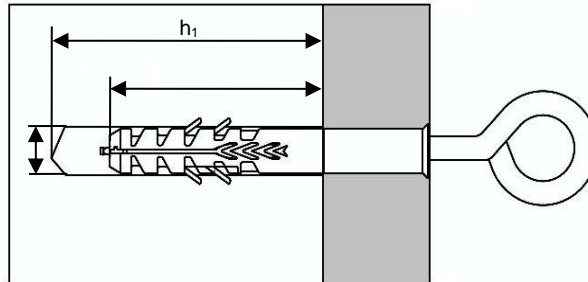
Plastic plug	Polyamide
--------------	-----------

Installation: GD 14 + GRS 12

Equipment

Anchor size	GD 14/plug length
Rotary hammer	TE 2 – TE 16
Other tools	14mm drill bit length to suit hole required.

Select the combination of scaffold screw and Anchor body from the table in the setting instructions below. Noting that l_D is the thickness of render or other non-load bearing material.



Setting details: depth of drill hole h_1 and effective anchorage depth h_{nom}

			GD 14
Nominal diameter of drill bit	d_o	[mm]	14
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	14,5
Depth of drill hole	$h_1 \geq$	[mm]	$90 + l_D$
Effective anchorage depth	h_{nom}	[mm]	70
Installation temperature		[°C]	-10 to +40
Recommended length of screw in structural base material	l_d	[mm]	75

Setting instructions

$d_o = \text{Ø } 14 \text{ mm}$

	GRS					l_D	h_1	
	12/90	12/120	12/160	12/190	12/230	12/350	[mm]	[mm]
14/70	✓	✓	✓	✓	✓	✓	0	90
14/100	✗	✓	✓	✓	✓	✓	1 ... 30	120
14/135	✗	✗	✓	✓	✓	✓	31 ... 65	155
14/185	✗	✗	✗	✓	✓	✓	66 ... 110	205

Use only for applications for fixing scaffolds to structural wall and floors. Not to be used for soffit and façade applications. For detailed information on installation see instruction for use supplied with the package of the product.

Scaffold tie and anchor testing

Where the data given above is not applicable, the capacity of the anchors can be found from testing.

The performance of the fixing is ultimately limited by the substrate that it is made into and because scaffolding has to be attached to the structure as is and not to what we want to be there, tests are needed to complete the process of tie selection. Tests are required both for "Preliminary" testing and for "Proof" testing as described in CFA Guidance Note: Anchor Systems for Scaffolding: "NASC TG 4:11".

In order to carry out these tests Hilti can supply our HAT 28 Scaffold Tester Kit item no 00321481 which comes with detailed instructions for use if these have been lost or mislaid they may also be downloaded from the technical library at www.hilti.co.uk/technical .



Kit Contents		
285523	HAT 28 Tensile tester	1
407289	Gauge 0 - 20kN (Fixed)	1
285559	Threaded stud adapter M16	1
285551	Adapter for Scaffold ringbolts (clevis + locking pin)	1
285531	Bolt tester adaptor	1
285533	Load spreading bridge 150	1
285534	Threaded legs set 50mm	1 set
	Set of screws M6, M8, M10, M12, M16	1 set
	Hexagonal wrench set 2.5 and 3 mm	1 set
311874	Case	1

Instructions for the interpretation of test result are given in the CFA Guidance note mentioned above which can be downloaded from the CFA website at www.fixingscfa.co.uk .

DS	0191	Iss	10
-----------	-------------	------------	-----------

HILTI TECHNICAL ADVISORY SERVICE TELEPHONE 0161 886 1144

IMPORTANT NOTES

1. The information and recommendations given herein are believed to be correct at the time of writing. The data has been obtained from tests done under laboratory, or other controlled, conditions and it is the users' responsibility to use the data given in the light of conditions on site and taking account of the intended use of the products concerned. Whilst Hilti (Gt. Britain) Limited can give general guidance and advice, the nature of Hilti products means that the ultimate responsibility for selecting the correct product for a particular application must lie with the customer.
2. All products must be used, handled and applied in accordance with current instructions for use published by Hilti (Gt. Britain) Limited.
3. All products are supplied, and advice given, subject to Hilti (Gt. Britain) Limited terms of business.
4. Hilti's policy is one of continuous development. We therefore reserve the right to alter specifications etc. without notice.
5. Construction materials and conditions vary on different sites. If it is suspected that the base material has insufficient strength to achieve a suitable fixing, contact the Hilti Technical Advisory Service.



Hilti (Gt. Britain) Ltd is a member of the Construction Fixings Association.