



# Ground Precision Components



## Ground Precision Components

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FIBRO Precision Components cover a very wide range of materials, shapes and sizes and thus permit virtually unrestricted selection even to highly individual requirements.

At Hassmersheim and also abroad, stock levels of Precision Components reach seven-digit figures. It is therefore quite likely that your particular choice will be available for immediate delivery. Should this not be the case then our flexible batch production schedules will ensure that delays are kept to a minimum.

Batch production in our interpretation not only spells prompt delivery but also exceptional quality. Starting with the arrival inspection of raw materials, every single manufacturing operation on FIBRO Precision Components is followed by a quality check. Lastly, an uncompromising final inspection of each and every part guarantees that the trade mark FIBRO is and remains synonymous with Quality.

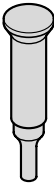
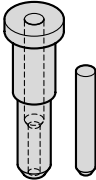

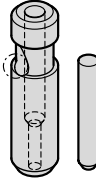

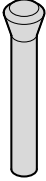

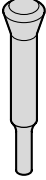

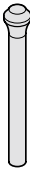



In view of the fact that a large portion of the Precision Components programme consists of punches and matrices, the importance of alignment in the operational die must be emphasized. Unless this requirement can be met to a high degree of accuracy, even the finest efforts in design and in the toolroom must fail! Die alignment ultimately depends on the guides – FIBRO Die Sets and Guide Elements were developed and are made with this postulate in mind.

Tool life, production cost and work quality are to a large extent a function of tooling material selection versus strip stock characteristics and ancillary process conditions. A judicious choice from the wide range of materials for our punches and matrices will be facilitated by the orientation guide in this catalogue. Listing the principal characteristics of each material together with selection criteria, it is intended to help customers make the right choice.

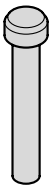
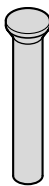
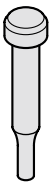

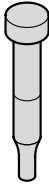

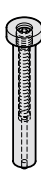

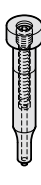



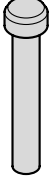

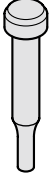

Our experienced tooling specialists will assist you with further detailed information.

In keeping with the basic tenet of our firm, every effort is made to ensure that design, performance potential and quality of FIBRO Precision Components keep well abreast with latest technological developments.

Contents

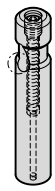
	Comparative graphs	E15		232.	E24
				Punch VDI 3374	
	Precision components - Description of materials	E16-17		233.	E25
				Insert sleeve with thrust pin VDI 3374 Shape A	
	222.	E18		234.	E26
	Punch DIN 9861 Shape DA			Insert sleeve with thrust pin VDI 3374 Shape B	
	223.	E19		2281.	E27
	Punch DIN 9861 Shape D / ISO 6752			Punch with tapered head 30°, Shape D	
	224.	E20		2291.	E28
	Punch DIN 9861 Shape CA			Punch with tapered head 30°, Shape C	
	225.	E21		2284.3.	E30
	Punch DIN 9861 Shape C			Punch with tapered head, Shape D	
	274.	E22		2284.00.	E31
	Punch similar to DIN 9861 Shape CA			Piloted counterbore for tapered-head punch	
	275.	E23			E32
	Punch similar to DIN 9861 Shape C			Punches - Mounting guidelines	

# Contents

	<b>220.</b> Punch DIN 9844, Shape A	<b>E33</b>		<b>272.</b> Punch similar DIN 9861, Shape D	<b>E43</b>
	<b>221.</b> Punch DIN 9844, Shape B	<b>E34</b>		<b>273.</b> Punch similar DIN 9861, Shape C	<b>E44</b>
	<b>266.</b> Punch similar to VDI 3374	<b>E35</b>		<b>2202.</b> Ball lock punch, blank, light duty	<b>E47</b>
	<b>267.</b> Punch with ejector pin	<b>E36</b>		<b>2212.</b> Ball lock punch, stepped, round, light duty	<b>E48</b>
	<b>268.</b> Punch with ejector pin, stepped, short point	<b>E37</b>		<b>2222.</b> Ball lock punch, stepped, square, light duty	<b>E49</b>
	<b>269.</b> Punch with ejector pin, stepped, long point	<b>E38</b>		<b>2232.</b> Ball lock punch, stepped, rectangular, light duty	<b>E50</b>
	<b>270.</b> Punch similar DIN 9844, Shape A	<b>E41</b>		<b>2242.</b> Ball lock punch, stepped, slot, light duty	<b>E51</b>
	<b>271.</b> Punch similar DIN 9844, Shape B	<b>E42</b>		<b>2252.</b> Ball lock punch, stepped, rectangle with radiussed corners, light duty	<b>E52</b>

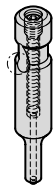


## Contents



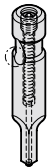
2702. E53

Ball lock punch, blank, with ejector pin, light duty



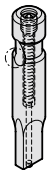
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Ball lock punch, stepped, round, with ejector pin, light duty



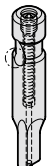
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Ball lock punch, stepped, square, with ejector pin, light duty



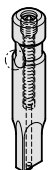
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Ball lock punch, stepped, rectangular, with ejector pin, light duty



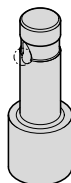
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Ball lock punch, stepped, slot, with ejector pin, light duty



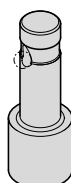
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Ball lock punch, stepped, rectangle with radiussed corners, with ejector pin, light duty



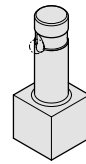
2204. E59

Ball lock punch, punch larger than shaft, blank, light duty



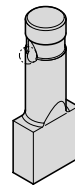
2214. E60

Ball lock punch, punch larger than shaft, round, light duty



2224. E61

Ball lock punch, punch larger than shaft, square, light duty



2234. E62

Ball lock punch, punch larger than shaft, rectangular, light duty



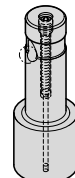
2244. E63

Ball lock punch, punch larger than shaft, slot, light duty



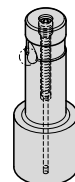
2254. E64

Ball lock punch, punch larger than shaft, rectangle with radiussed corners, light duty



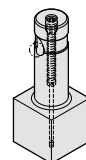
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Ball lock punch, punch larger than shaft, blank, with ejector pin, light duty



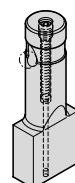
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Ball lock punch, punch larger than shaft, round, with ejector pin, light duty



2724. E67

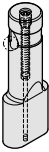
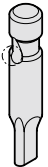
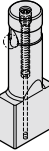
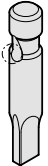

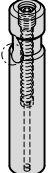

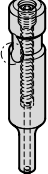

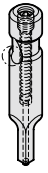

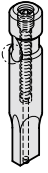
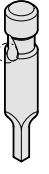

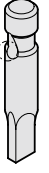
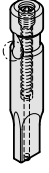
Ball lock punch, punch larger than shaft, square, with ejector pin, light duty



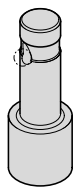
2734. E68

Ball lock punch, punch larger than shaft, rectangular, with ejector pin, light duty

## Contents

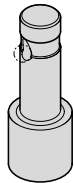
	<b>2744.</b>	<b>E69</b>		<b>2243.</b>	<b>E77</b>
Ball lock punch, punch larger than shaft, slot, with ejector pin, light duty				Ball lock punch, stepped, slot, heavy duty	
	<b>2754.</b>	<b>E70</b>		<b>2253.</b>	<b>E78</b>
Ball lock punch, punch larger than shaft, rectangle with radiussed corners, with ejector pin, light duty				Ball lock punch, stepped, rectangle with radiussed corners, heavy duty	
	<b>2262.</b>	<b>E71</b>		<b>2703.</b>	<b>E79</b>
Ball lock pilot pin, with tapered tip, light duty				Ball lock punch, blank, with ejector pin, heavy duty	
	<b>2272.</b>	<b>E72</b>		<b>2713.</b>	<b>E80</b>
Ball lock pilot pin, with parabolic tip, light duty				Ball lock punch, stepped, round, with ejector pin, heavy duty	
	<b>2203.</b>	<b>E73</b>		<b>2723.</b>	<b>E81</b>
Ball lock punch, blank, heavy duty				Ball lock punch, stepped, square, with ejector pin, heavy duty	
	<b>2213.</b>	<b>E74</b>		<b>2733.</b>	<b>E82</b>
Ball lock punch, stepped, round, heavy duty				Ball lock punch, stepped, rectangular, with ejector pin, heavy duty	
	<b>2223.</b>	<b>E75</b>		<b>2743.</b>	<b>E83</b>
Ball lock punch, stepped, square, heavy duty				Ball lock punch, stepped, slot, with ejector pin, heavy duty	
	<b>2233.</b>	<b>E76</b>		<b>2753.</b>	<b>E84</b>
Ball lock punch, stepped, rectangular, heavy duty				Ball lock punch, stepped, rectangle with radiussed corners, with ejector pin, heavy duty	

## Contents



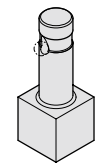
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Ball lock punch, punch larger than shaft, blank, heavy duty



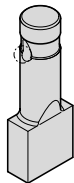
2215. E86

Ball lock punch, punch larger than shaft, round, heavy duty



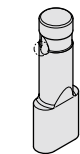
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Ball lock punch, punch larger than shaft, square, heavy duty



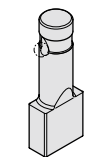
2235. E88

Ball lock punch, punch larger than shaft, rectangular, heavy duty



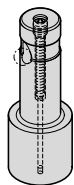
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Ball lock punch, punch larger than shaft, slot, heavy duty



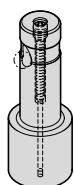
2255. E90

Ball lock punch, punch larger than shaft, rectangle with radiussed corners, heavy duty



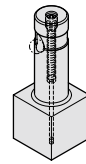
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Ball lock punch, punch larger than shaft, blank, with ejector pin, heavy duty



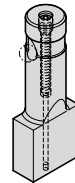
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Ball lock punch, punch larger than shaft, round, with ejector pin, heavy duty



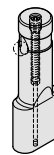
2725. E93

Ball lock punch, punch larger than shaft, square, with ejector pin, heavy duty



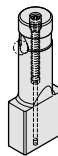
2735. E94

Ball lock punch, punch larger than shaft, rectangular, with ejector pin, heavy duty



2745. E95

Ball lock punch, punch larger than shaft, slot, with ejector pin, heavy duty



2755. E96

Ball lock punch, punch larger than shaft, rectangle with radiussed corners, with ejector pin, heavy duty



2263. E97

Ball lock pilot pin, with tapered tip, heavy duty



2273. E98

Ball lock pilot pin, with parabolic tip, heavy duty



2201. E101


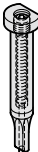

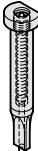

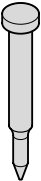

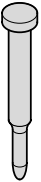
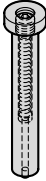

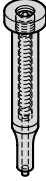
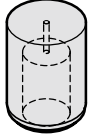
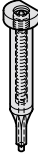
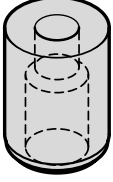
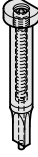
Punch, blank, ISO 8020



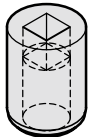
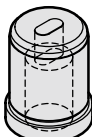
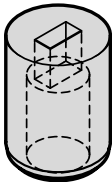
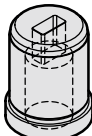
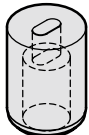
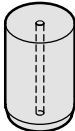
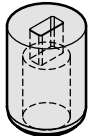
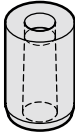
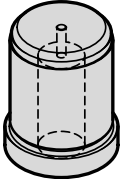
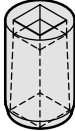
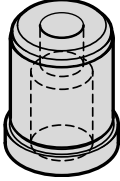
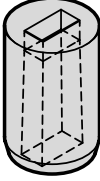
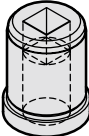
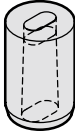
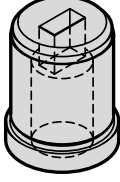
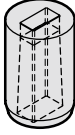
2211. E102

Punch, stepped, round, ISO 8020

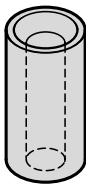
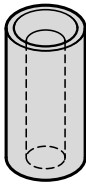
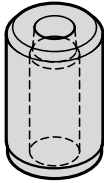
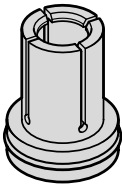
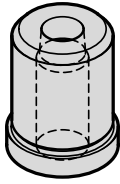
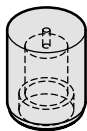
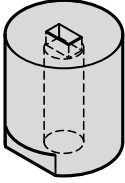
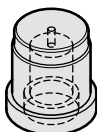
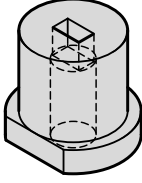
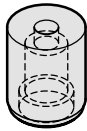
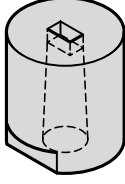
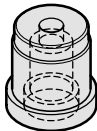
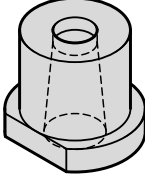
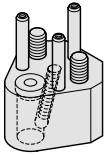
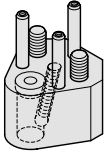
## Contents

	<b>2221.</b> Punch, stepped, square, ISO 8020	<b>E103</b>		<b>2741.</b> Punch, stepped, slot, with ejector pin, ISO 8020	<b>E111</b>
	<b>2231.</b> Punch, stepped, rectangular, ISO 8020	<b>E104</b>		<b>2751.</b> Punch, stepped, rectangle with radiussed corners, with ejector pin, ISO 8020	<b>E112</b>
	<b>2241.</b> Punch, stepped, slot, ISO 8020	<b>E105</b>		<b>2261.</b> Pilot pin with tapered tip, ISO 8020	<b>E113</b>
	<b>2251.</b> Punch, stepped, rectangle with radiussed corners, ISO 8020	<b>E106</b>		<b>2271.</b> Pilot pin with parabolic tip, ISO 8020	<b>E114</b>
	<b>2701.</b> Punch, blank, with ejector pin, ISO 8020	<b>E107</b>		<b>2276.</b> Pilot unit to Mercedes-Benz Standard	<b>E115</b>
	<b>2711.</b> Punch, stepped, round, with ejector pin, ISO 8020	<b>E108</b>		<b>2606.</b> Matrix without shoulder, blank, ISO 8977	<b>E119</b>
	<b>2721.</b> Punch, stepped, square, with ejector pin, ISO 8020	<b>E109</b>		<b>2616.</b> Matrix without shoulder, round, ISO 8977	<b>E120</b>
	<b>2731.</b> Punch, stepped, rectangular, with ejector pin, ISO 8020	<b>E110</b>		Anti-rotation element	<b>E121-141</b>

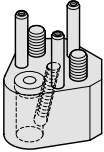
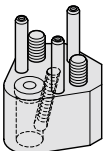
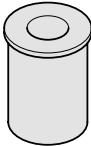
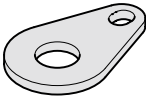
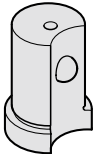
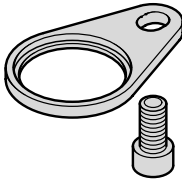
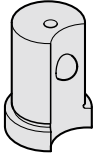
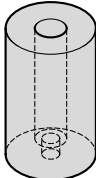
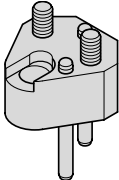
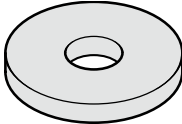
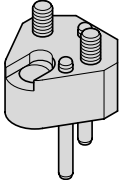
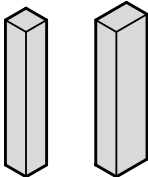
## Contents

	2626.	E122		2647.	E138
	Matrix without shoulder, square, ISO 8977			Matrix with shoulder, slot, ISO 8977	
	2636.	E124		2657.	E140
	Matrix without shoulder, rectangular, ISO 8977			Matrix with shoulder, rectangle with radiussed corners, ISO 8977	
	2646.	E126		2605.	E142
	Matrix without shoulder, slot, ISO 8977			Matrix without shoulder, blank, Automotive Standard	
	2656.	E128		2615.	E143
	Matrix without shoulder, rectangle with radiussed corners, ISO 8977			Matrix without shoulder, round, Automotive Standard	
	2607.	E131		2625.	E144
	Matrix with shoulder, blank, ISO 8977			Matrix without shoulder, square, Automotive Standard	
	2617.	E132		2635.	E145
	Matrix with shoulder, round, ISO 8977			Matrix without shoulder, rectangular, Automotive Standard	
	2627.	E134		2645.	E146
	Matrix with shoulder, square, ISO 8977			Matrix without shoulder, slot, Automotive Standard	
	2637.	E136		2655.	E147
	Matrix with shoulder, rectangular, ISO 8977			Matrix without shoulder, rectangle with radiused corners, Automotive Standard	

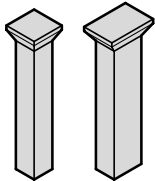
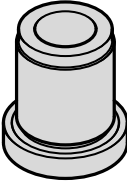

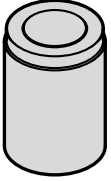



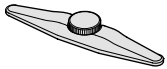

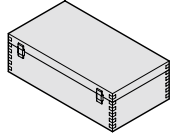
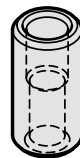





# Contents

	<b>262.</b> Guide bush for punch DIN 9845, Shape C	<b>E148</b>			
	<b>2621.</b> Guide bush for punch ISO 8978	<b>E149</b>			
	<b>260.</b> Matrix without collar, DIN 9845 Shape A	<b>E150</b>		<b>2618.</b> Dynamic stripping element (DAE)	<b>E157-161</b>
	<b>261.</b> Matrix with collar, DIN 9845 Shape B	<b>E151</b>		<b>2618.06.</b> Matrix without collar for dynamic stripper (DAE), blank	<b>E165</b>
	<b>2602.</b> Matrix without collar, cylindrical	<b>E152</b>		<b>2618.07.</b> Matrix with collar for dynamic stripper (DAE), blank	<b>E166</b>
	<b>2612.</b> Matrix with collar, cylindrical	<b>E153</b>		<b>2618.16.</b> Matrix without collar for dynamic stripper (DAE), round	<b>E167</b>
	<b>2601.</b> Matrix without collar, conical	<b>E154</b>		<b>2618.17.</b> Matrix with collar for dynamic stripper (DAE), round	<b>E168</b>
	<b>2611.</b> Matrix with collar, conical	<b>E155</b>		<b>2664.05.</b> Triangle retainer for ball-lock punches, light duty	<b>E170</b>
				<b>2664.06.</b> Triangle retainer for ball-lock punches, heavy duty	<b>E171</b>

## Contents

	<b>2664.07.</b> Triangle retainer for ball-lock punches, light duty	<b>E172</b>			<b>E181</b>
	<b>2664.10.</b> Triangle retainer for ball-lock punches, heavy duty	<b>E173</b>			<b>2431.7.</b> Stripping unit for punches <b>E182</b>
	<b>E174</b> Accessories for Retainers, triangular, for Ball-Lock Punches			<b>2667.1.</b> Stripping unit - Pressure plate	<b>E183</b>
	<b>2668.2.</b> ACCU-LOCK Fixture device for ball-lock punches, light duty	<b>E175</b>		<b>2667.2.</b> Stripping unit - Mounting plate	<b>E184</b>
	<b>2668.3.</b> ACCU-LOCK Fixture device for ball-lock punches, heavy duty	<b>E176</b>		<b>243.7.</b> Elastomer Stripper	<b>E186</b>
	<b>2664.02.</b> Triangle retainer, for punches ISO 8020 without anti-rotation element	<b>E178</b>		<b>243.7. .1</b> Stop washer	<b>E187</b>
	<b>2664.04.</b> Triangle retainer, for punches ISO 8020 with anti-rotation element	<b>E179</b>		<b>E188-189</b> High-Precision special parts to customer's drawings	
	<b>E180</b> Accessories for retainers, triangular, for punches ISO 8020			<b>230.</b> Punch without head, square / rectangular, Shape A	<b>E190</b>

# Contents

	<b>231.</b> Punch with head, square / rectangular, Shape A	<b>E191</b>		<b>276.</b> Drill bush with collar, DIN 172, Shape A	<b>E200</b>
	<b>236.1.</b> Dowel pin with internal extracting thread, similar to DIN EN ISO 8735	<b>E192</b>		<b>277.</b> Drill bush without collar, DIN 179, Shape A	<b>E201</b>
	<b>2361.1.</b> Dowel pin with internal extracting thread, similar to DIN EN ISO 8735	<b>E193</b>		<b>240.1./2.</b> Gauge pin DIN 2269	<b>E202</b>
	<b>236.001.</b> FIBROZIPP	<b>E194</b>		<b>240.45.</b> Gauge pin holder	<b>E204</b>
	<b>265.1.</b> Liner bush for dowel pin, for bonding	<b>E196</b>		<b>240.91.</b> Wooden box	<b>E204</b>
	<b>2650.1.</b> Liner bush for dowel pin, for push fit	<b>E197</b>		<b>240.92.</b> Wooden box	<b>E204</b>
	<b>235.1.</b> Dowel pin similar to DIN EN ISO 8734	<b>E198</b>		<b>240.11.</b> Gauge pin with handle	<b>E205</b>
	<b>2351.1.</b> Dowel pin similar to DIN EN ISO 8734	<b>E199</b>		<b>240.22.</b> Gauge pin with handle	<b>E205</b>



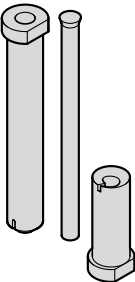
Contents

240.31. E205

Gauge pins - boxed set

240.32. E205

Gauge pin - boxed set

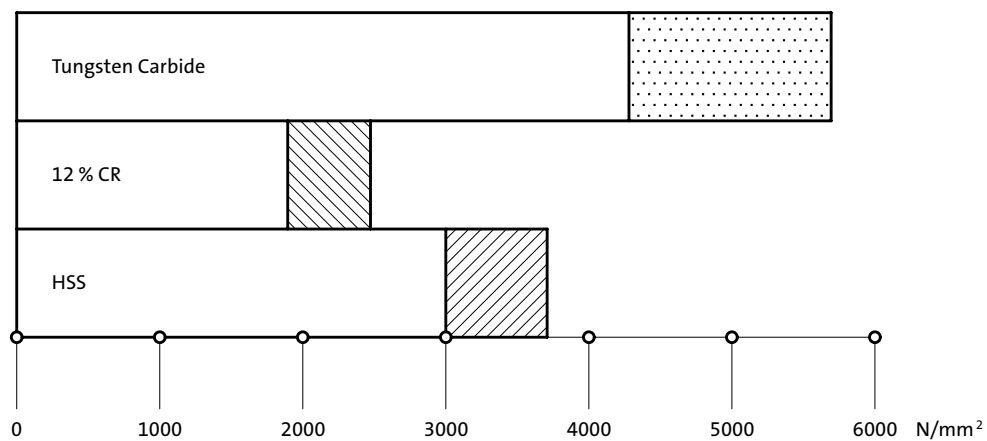


2282.01. E206

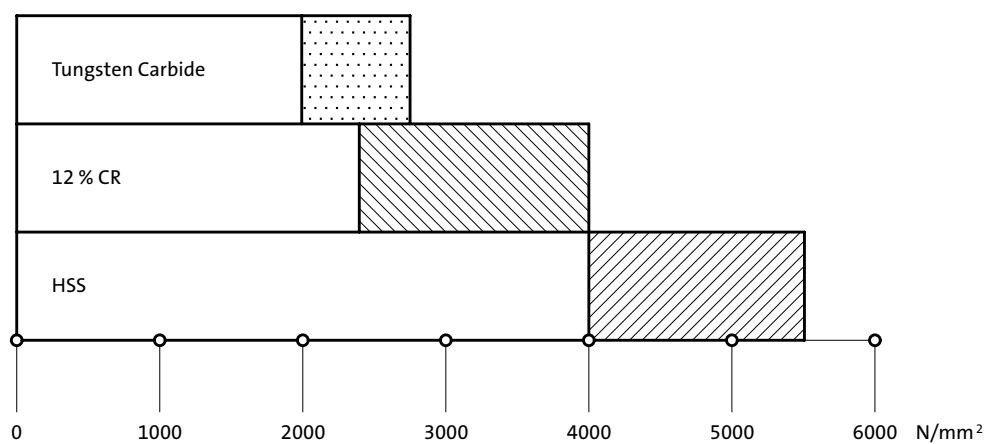
Punching and embossing unit with matrix for punched holes and self tapping screws

## Comparative Graphs

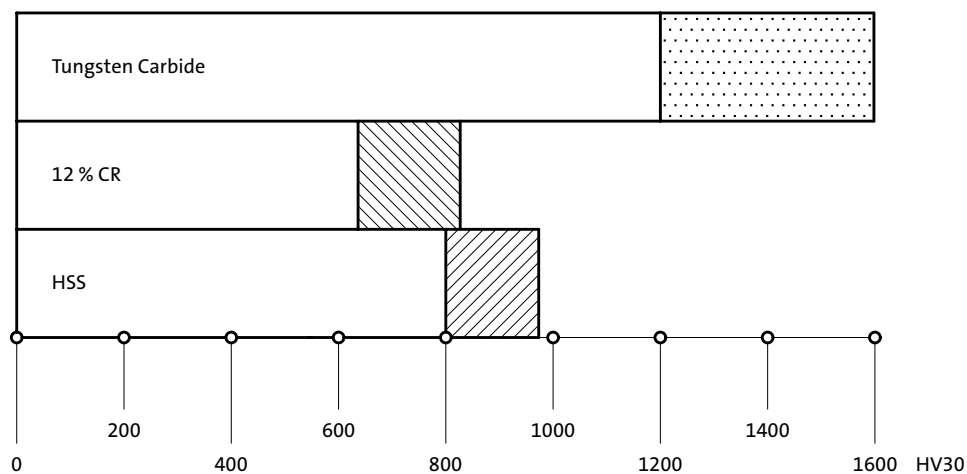
### Compressive Strength (0,2% Proof Stress)



### Flexural Strength



### Hardness Vickers



## FIBRO Punches and Matrixes – Description of Materials

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### WS = Alloy Tool Steel

Material No 1.2210, 1.2516, 1.2842 or similar.

Characteristics:

Hard and tough tool steel, medium wear resistance.

Application Field:

Piercing/blanking dies for mild steel, low carbon steels, non-ferrous metals, plastics, paper.

e.g. **WS** = material code number = "1"  
Order No = 239.1. ...

### HWS = High Carbon – High Chrome Tool Steel (12% Cr)

Material No 1.2436, 1.2379 or similar.

Characteristics:

High resistance to wear.

Application Field:

Piercing/blanking dies of all types, trim dies, for all carbon steels, alloy steels, non-ferrous metals, plastics, paper.

e.g. **HWS** = material code number = "2"  
Order No = 260.2. ...

### HSS = High Speed Steel

Material No 1.3343 or similar.

Characteristics:

High wear resistance; high tempering curve permits certain surface treatments.

Application Field:

Piercing/blanking dies of all types – for tough materials e.g. spring steel, lamination steels, and abrasive papers as well as plastics.

e.g. **HSS** = material code number = "3"  
Order No = 220.3. ...

### ASP 23 = High Speed Steel on Powder-Metallurgic Basis ASP 2023

Characteristics:

High wear resistance – greater toughness due to excellent homogeneity.

Application Field:

Same as HSS.

e.g. **ASP 23**  
**ASP 2023** = material code number = "6"  
Order No = 223.6. ...

### HST = High Speed Steel, Nitrided

Characteristics:

High wear resistance – reduced galling tendency on account of nitrides infused into top layer of material.

Application Field:

Piercing/blanking dies of all types – for very hard and abrasive materials.

e.g. **HST** = material code number = "4"  
Order No = 223.4. ...

### FT = Ferro-Tic (Ferro Titanit)

Characteristics:

Between those of HSS and hard metals (tungsten carbides); machinable in the supplied state – hardness conferred by heat treatment.

Application Field:

Fine blanking and progression/lamination dies for large quantities of parts from abrasive, hard materials, also silicon steels and stainless steels.

**FT** special manufacture  
– on request –

## FIBRO Punches and Matrixes – Description of Materials

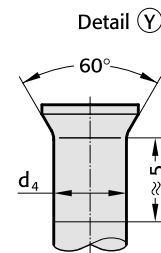
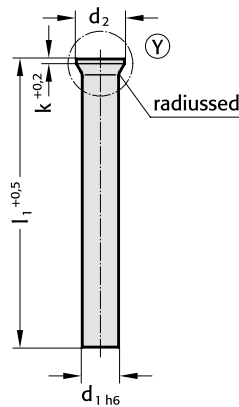
<b>HZ</b>	<b>= Hard-coated Tooling Components for High-Performance</b>
Carrier Materials:	HZC Composite Vapour Deposition (CVD) <b>TIC-TIN</b> Coating HSS Material No 1.3207 and 1.3343 etc. HCHC Material No 1.2379 and 1.2436 etc.
Properties:	The titanium carbide substrate provides a pressure-resistant bond with the carrier metal, while the outer layer of titanium nitride offers the well-known advantages of optimum tribologic behaviour in contact with the stamping stock. By virtue of its outstanding wear resistance, the TIN-layer largely eliminates seizing and cold welding problems in stamping. Surface Hardness: approx. 3500 HV 0,05 Coating Thickness: 5 to 8 µm approx.
Applications:	All tooling components subject to high demands on wear resistance and performance, especially punches in progression/combination tools, as well as cold extrusion punches etc. Owing to distortion problems, TIC-TIN is not recommended for parts with a length/thickness ratio than 20:1.
	<b>TIC-TIN = material code number = "5"</b> e. g. Order No = 223.5 ...
Carrier Material:	HZN Titanium Nitride Coating <b>TIN-PVD</b> (physical vapour deposition). HSS Material No 1.3207 and 1.3343 etc. HCHC Material No 1.2379 (HCHC-steels are of conditional suitability)
Properties:	The TIN-coating offers excellent frictional characteristics but its compressive strength remains inferior to TIC-TIN deposits. The TIN-deposition process can be applied to partial, selected areas of the tooling component. Surface Hardness: approx. 2300 HV 0,05 Coating Thickness: 2–4 µm < Ø 20 = 1,5 µm ± 20 %
Applications:	Tooling for thin stamping stock such as cold rolled spring steel, zinc-galvanized sheet and strip, copper-beryllium bronze, german silver, and solenoid lamination steels. Note that the ratio stock thickness to punch point diameter should not exceed 1:3.
	<b>TIN = material code number = "0"</b> e. g. Order No = 223.0 ...
<b>HM</b>	<b>= Tungsten Carbide</b>
Characteristics:	Hard-sintered carbide on WC-basis and of recognized properties; produced by powder-metallurgic processes, FIBRO's exclusively used HIP-densified carbide exhibits much enhanced flexural strength and reduced residual porosity.
Application Field:	Die components for highest performance and very large stamping volumes – for altogether ultimate demands on tool life.
	<b>HM = material code number = "9"</b> e. g. Order No = 270.9 ...
<b>NWA</b>	<b>= Hot-Work Tool Steel – Suitable for Nitriding</b>
	Material No 1.2344 or similar.
Characteristics:	Chrome-Molybdenum-Vanadium hot working die steel; core strength: > 1400 N/mm <sup>2</sup> ; temperature resistant up to 650°C; surface hardness (nitrided) ≥ 950 HV 0,3.
Application Field:	Ejector pins for pressure diecasting, injection- and compression moulding processes, and generally for work at elevated temperatures.
	<b>NWA = material code number = "8"</b> e. g. Order No = 237.8 ...



## Punch DIN 9861 Shape DA



222.



### 222. Punch DIN 9861 Shape DA

Diameter steps							
d <sub>1</sub>	d <sub>1</sub>	d <sub>2</sub>	k	l <sub>1</sub>	71	80	100
0.5	0.05	0.9	0.2		●	●	●
0.55	0.05	1	0.2		●	●	●
0.6	0.05	1.1	0.2		●	●	●
0.65	0.05	1.2	0.2		●	●	●
0.7 - 0.75	0.05	1.3	0.2		●	●	●
0.8 - 0.85	0.05	1.4	0.4		●	●	●
0.9 - 0.95	0.05	1.6	0.4		●	●	●
1 - 1.1	0.1	1.8	0.5		●	●	●
1.2 - 1.3	0.1	2	0.5		●	●	●
1.4 - 1.5	0.1	2.2	0.5		●	●	●
1.6 - 1.7	0.1	2.5	0.5		●	●	●
1.8 - 1.9	0.1	2.8	0.5		●	●	●
2	0.1	3	0.5		●	●	●
2.1 - 2.2	0.1	3.2	0.5		●	●	●
2.3 - 2.5	0.1	3.5	0.5		●	●	●
2.6 - 2.9	0.1	4	0.5		●	●	●
3 - 3.4	0.1	4.5	0.5		●	●	●
3.5 - 3.9	0.1	5	0.5		●	●	●
4 - 4.4	0.1	5.5	0.5		●	●	●
4.5 - 4.9	0.1	6	0.5		●	●	●
5 - 5.4	0.1	6.5	0.5		●	●	●
5.5 - 5.9	0.1	7	0.5		●	●	●
6 - 6.4	0.1	8	0.5		●	●	●
6.5 - 7	0.5	9	1		●	●	●
7.5 - 8	0.5	10	1		●	●	●
8.5 - 9	0.5	11	1		●	●	●
9.5 - 10	0.5	12	1		●	●	●
10.5 - 11	0.5	13	1		●	●	●
11.5 - 12	0.5	14	1		●	●	●
12.5 - 13	0.5	15	1		●	●	●
13.5 - 14	0.5	16	1.5		●	●	●
14.5 - 15	0.5	17	1.5		●	●	●
15.5 - 16	0.5	18	1.5		●	●	●

### Material:

HSS

Order No 222.3.

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 3 HRC

HST

Order No 222.4.

Hardness:

Surface ≥ 950 HV 0,3

Head 52 ± 3 HRC

HZ - TIN (HSS)

Order No 222.0.

Hardness:

Surface 2300 HV 0,05

Head 52 ± 3 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

Shaft precision ground. Head hot upset-forged and tempered. Residual upset bulge below head normally much smaller than permissible acc. to DIN 9861.

d<sub>4</sub>: For d<sub>1</sub> < 1 mm d<sub>4</sub>=d<sub>1</sub> + 0,02

For d<sub>1</sub> ≥ 1 mm d<sub>4</sub>=d<sub>1</sub> + 0,03

Stock lengths: 71, 80, 100 mm.

other lengths and diameters on request!

### Note:

Punches are also available without head

### Ordering Code (example):

Punch DIN 9861 Shape DA =222.

Material MAT HSS = 3.

Shaft diameter d<sub>1</sub> 3 mm = 0300.

Length l<sub>1</sub> 71 mm = 071

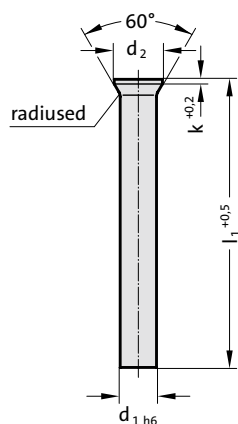
Order No =222.3.0300.071

# Punch DIN 9861 Shape D / ISO 6752



FIBRO

223.



## Material:

HSS

Order No 223.3.

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 3 HRC

HST

Order No 223.4.

Hardness:

Surface ≥ 950 HV 0,3

Head 52 ± 3 HRC

HZ - TIN (HSS)

Order No 223.0.

Hardness:

Surface 2300 HV 0,05

Head 52 ± 3 HRC

ASP 23 - ASP 2023

Order No 223.6.

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 3 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged and tempered. Shaft and head subsequently precision plunge-ground for perfect concentricity and full interchangeability with replacement punches.

Stock lengths: 71, 80, 100 mm.  
other lengths and diameters on request!

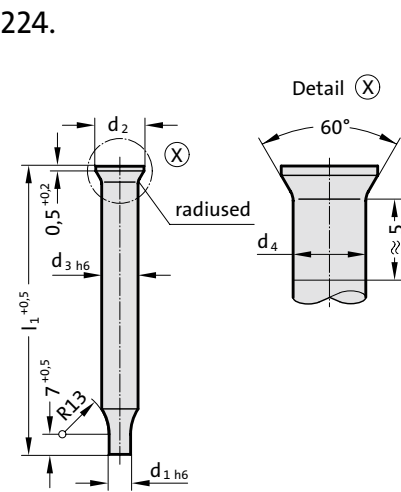
## 223. Punch DIN 9861 Shape D / ISO 6752

Diameter steps							
d <sub>1</sub>	d <sub>1</sub>	d <sub>2</sub>	k	l <sub>1</sub>	71	80	100
0.5	0.05	0.9	0.2		●	●	●
0.55	0.05	1	0.2		●	●	●
0.6	0.05	1.1	0.2		●	●	●
0.65	0.05	1.2	0.2		●	●	●
0.7 - 0.75	0.05	1.3	0.2		●	●	●
0.8 - 0.85	0.05	1.4	0.4		●	●	●
0.9 - 0.95	0.05	1.6	0.4		●	●	●
1 - 1.1	0.1	1.8	0.5		●	●	●
1.2 - 1.3	0.1	2	0.5		●	●	●
1.4 - 1.5	0.1	2.2	0.5		●	●	●
1.6 - 1.7	0.1	2.5	0.5		●	●	●
1.8 - 1.9	0.1	2.8	0.5		●	●	●
2	0.1	3	0.5		●	●	●
2.1 - 2.2	0.1	3.2	0.5		●	●	●
2.3 - 2.5	0.1	3.5	0.5		●	●	●
2.6 - 2.9	0.1	4	0.5		●	●	●
3 - 3.4	0.1	4.5	0.5		●	●	●
3.5 - 3.9	0.1	5	0.5		●	●	●
4 - 4.4	0.1	5.5	0.5		●	●	●
4.5 - 4.9	0.1	6	0.5		●	●	●
5 - 5.4	0.1	6.5	0.5		●	●	●
5.5 - 5.9	0.1	7	0.5		●	●	●
6 - 6.4	0.1	8	0.5		●	●	●
6.5 - 7	0.5	9	1		●	●	●
7.5 - 8	0.5	10	1		●	●	●
8.5 - 9	0.5	11	1		●	●	●
9.5 - 10	0.5	12	1		●	●	●
10.5 - 11	0.5	13	1		●	●	●
11.5 - 12	0.5	14	1		●	●	●
12.5 - 13	0.5	15	1		●	●	●
13.5 - 14	0.5	16	1.5		●	●	●
14.5 - 15	0.5	17	1.5		●	●	●
15.5 - 16	0.5	18	1.5		●	●	●
16.5 - 17	0.5	19	1.5		●	●	●
17.5 - 18	0.5	20	1.5		●	●	●
18.5 - 19	0.5	21	1.5		●	●	●
19.5 - 20	0.5	22	1.5		●	●	●

## Ordering Code (example):

Punch DIN 9861 Shape D / ISO 6752 =223.  
Material MAT HSS = 3.  
Shaft diameter d<sub>1</sub> 4 mm = 0400.  
Length l<sub>1</sub> 71 mm = 071  
Order No =223.3. 0400.071

# Punch DIN 9861 Shape CA



224. Punch DIN 9861 Shape CA

Diameter steps					
$d_1$	$d_1$	$d_2$	$d_3$	$d_4$	$l_1$
0.1 - 1.5	0.05	3	2	2.03	71
1.55 - 2.95	0.05	4.5	3	3.03	71

## Material:

HSS  
Order No 224.3.  
Hardness:  
Shaft  $64 \pm 2$  HRC  
Head  $52 \pm 3$  HRC

HZ - TIN (HSS)  
Order No 224.0.  
Hardnes:  
Surface 2300 HV 0,05  
Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Shaft precision ground. Head subsequently hot upset-forged and tempered; residual upset-buge below head normally much smaller than permissible acc. to DIN 9861.

Stock lenghts: 71 mm.  
Other lengths and diameters on request!

## Ordering Code (example):

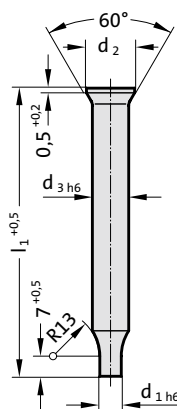
Punch DIN 9861 Shape CA	= 224.
Material MAT	HSS = 3.
Cutting diameter $d_1$	1.55 mm = 0155.
Length $l_1$	71 mm = 071
Order No	= 224.3. 0155.071

# Punch DIN 9861 Shape C



FIBRO

225.



## Material:

HSS

Order No 225.3.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

HST

Order No 225.4.

Hardness:

Surface  $\geq 950$  HV 0,3

Head  $52 \pm 3$  HRC

HZ - TIN (HSS)

Order No 225.0.

Hardness:

Surface 2300 HV 0,05

Head  $52 \pm 3$  HRC

ASP 23 - ASP 2023

Order No 225.6.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged and tempered. Shaft and head subsequently precision plunge-ground for perfect concentricity and full interchangeability with replacement punches.

Stock lengths: 71 mm.

other lengths and diameters on request!

## 225. Punch DIN 9861 Shape C

Diameter steps				
$d_1$	$d_1$	$d_2$	$d_3$	$l_1$
0.1 - 1.5	0.05	3	2	71
1.55 - 2.95	0.05	4.5	3	71

## Ordering Code (example):

Punch DIN 9861 Shape C =225.

Material MAT HSS = 3.

Cutting diameter  $d_1$  1.55 mm= 0155.

Length  $l_1$  71 mm = 071

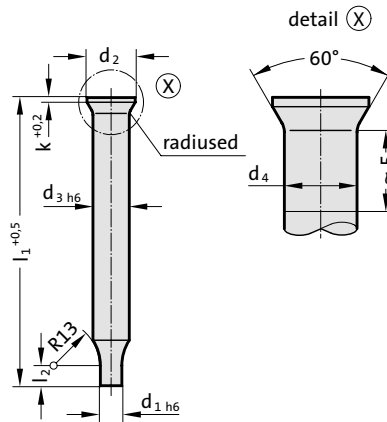
Order No =225.3.0155.071



## Punch similar to DIN 9861 Shape CA



274.



### 274. Punch similar to DIN 9861 Shape CA

Diameter steps										
$d_1$	$d_1$	$d_2$	$d_3$	$d_4$	$l_2$	$k$	$l_1$	71	80	100
1 - 3.9	0.05	5.5	4	4.03	5 - 20	0.5		●	●	●
1.5 - 4.9	0.05	6.5	5	5.03	5 - 20	0.5		●	●	●
1.6 - 5.9	0.05	8	6	6.03	5 - 20	0.5		●	●	●
2.5 - 7.9	0.05	10	8	8.03	5 - 20	1		●	●	●
4 - 9.9	0.05	12	10	10.03	5 - 20	1		●	●	●
5 - 12.9	0.05	15	13	13.03	5 - 20	1		●	●	●
8 - 15.9	0.05	18	16	16.03	5 - 20	1.5		●	●	●

### Description:

DIN 9861 restricts the range of stepped punches with conical head to shanks of 3 mm max. diameter and points of 2,95 mm max. diameter. Stepped punches of larger size are, however, quite popular owing to their rigidity and ability to sustain considerable stripping forces. In accommodation of this demand we supply larger sizes which are ground from stock sizes of the 222.-series.

Please select from those ranges and complete your order in accordance with the example on the right.

### Material:

HSS

Order No 274.3.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

HST

Order No 274.4.

Hardness:

Surface  $\geq 950$  HV 0,3

Head  $52 \pm 3$  HRC

HZ - TIN (HSS)

Order No 274.0.

Hardness:

Surface 2300 HV 0,05

Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

Shaft precision ground. Head subsequently hot upset-forged and tempered; residual upset-buge below head normally much smaller than permissible acc. to DIN 9861.

Stock lengths: 71, 80, 100 mm.

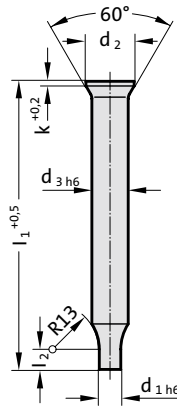
other lengths and diameters on request!

### Ordering Code (example):

Punch similar to DIN 9861 Shape CA	=274.
Material MAT	HSS = 3.
Shaft diameter $d_3$	8 mm = 0800.
Length $l_1$	71 mm = 071.
Cutting diameter $d_1$	2.5 mm = 0250.
Punch cutting length $l_2$	5 mm = 005
Order No	=274.3.0800.071.0250.005

## Punch similar to DIN 9861 Shape C

275.



### Description:

DIN 9861 restricts the range of stepped punches with conical head to shanks of 3 mm max. diameter and points of 2,95 mm max. diameter. Stepped punches of larger size are, however, quite popular owing to their rigidity and ability to sustain considerable stripping forces. In accommodation of this demand we supply larger sizes which are ground from stock sizes of the 223.-series. Please select from those ranges and complete your order in accordance with the example on the right.

### Material:

HSS

Order No 275.3.

Hardness: Shaft  $64 \pm 2$  HRC; Head  $52 \pm 3$  HRC

HST

Order No 275.4.

Hardness: Surface  $\geq 950$  HV 0,3; Head  $52 \pm 3$  HRC

HZ - TIN (HSS)

Order No 275.0.

Hardness: Surface 2300 HV 0,05; Head  $52 \pm 3$  HRC

ASP 23-ASP2023

Order No 275.6.

Hardness: Shaft  $64 \pm 2$  HRC; Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

Head hot upset-forged and tempered. Shaft and head subsequently precision plunge-ground for perfect concentricity and full interchangeability with replacement punches.

Stock lengths: 71, 80, 100 mm.

other lengths and diameters on request!

### 275. Punch similar to DIN 9861 Shape C

Diameter steps									
$d_1$	$d_1$	$d_2$	$d_3$	$l_2$	k	$l_1$	71	80	100
1 - 3.9	0.05	5.5	4	5 - 20	0.5		●	●	●
1.5 - 4.9	0.05	6.5	5	5 - 20	0.5		●	●	●
1.6 - 5.9	0.05	8	6	5 - 20	0.5		●	●	●
2.5 - 7.9	0.05	10	8	5 - 20	1		●	●	●
4 - 9.9	0.05	12	10	5 - 20	1		●	●	●
5 - 12.9	0.05	15	13	5 - 20	1		●	●	●
8 - 15.9	0.05	18	16	5 - 20	1.5		●	●	●

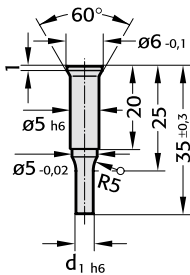
### Ordering Code (example):

Punch similar to DIN 9861 Shape C	=275.
Material MAT	HSS = 3.
Shaft diameter $d_3$	8 mm = 0800.
Length $l_1$	71 mm = 071.
Cutting diameter $d_1$	2.5 mm = 0250.
Punch cutting length $l_2$	5 mm = 005
Order No	=275.3.0800.071.0250.005

# Punch VDI 3374



232.



## 232. Punch VDI 3374

Diameter steps	
$d_1$	$d_1$
2 - 5	0.1

## Material:

HSS  
Order No 232.3.  
Hardness:  
Shaft  $64 \pm 2$  HRC  
Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged. Shaft and head subsequently precision plunge-ground.

## Note:

Matching insert sleeve 233. und 234.

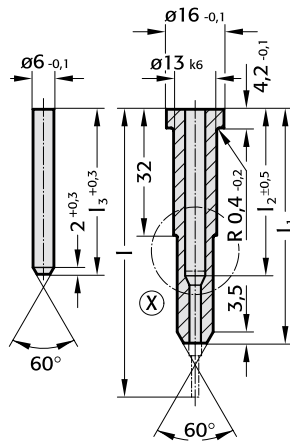
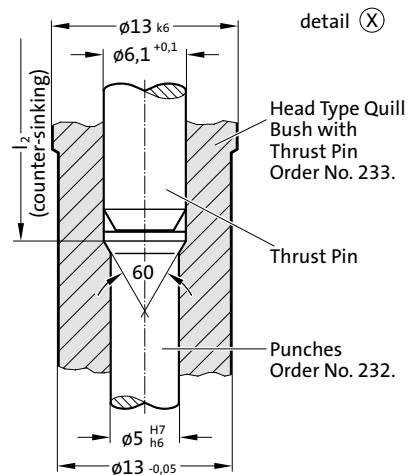
## Ordering Code (example):

Punch VDI 3374	=232.
Material MAT	HSS = 3.
Cutting diameter $d_1$	2 mm= 0200
Order No	=232.3. 0200



## Insert sleeve with thrust pin VDI 3374 Shape A

233.



### Material:

Insert sleeve:  
Steel C 45 heat treated to 800 N/mm<sup>2</sup>

Thrust pin:  
HWS, hardened 62 ± 2 HRC

### Execution:

Insert sleeve: shaft precision ground  
Thrust pin: ground

### Note:

Matching punch 232.

### 233. Insert sleeve with thrust pin VDI 3374 Shape A

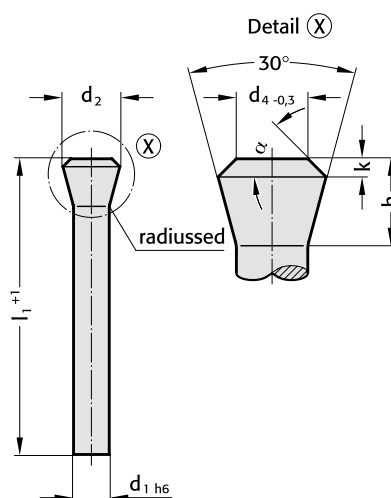
Order No	l	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>
233.7.048	63	48	29	29
233.7.057	71	57	37	37
233.7.065	80	65	46	46





## Punch with tapered head 30°, Shape D

2281.



### Material:

HSS

Order No 2281.3.

Hardness:

Shaft 58 + 2 HRC

Head ≤ 50 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

Head hot upset-forged and tempered. Shaft and head subsequently precision plunge-ground for perfect concentricity and full interchangeability with replacement punches.

### 2281. Punch with tapered head 30°, Shape D

$d_1$	$d_2$	$d_4$	$h$	$k$	$\alpha \pm 1^\circ$	$l_1$	$l_1$
						100	120
5.5	8.98	5.5	7.5	1	30	●	●
6	9.75	6	8	1	28	●	●
8	12.8	8	10	1	22.5	●	●
9	14.4	9	11	1	20	●	●
10	15.9	10	12	1	19	●	●
12	18.7	12	14	1.5	24	●	●
14	21.8	14	16	1.5	21	●	●
16	24.6	16	18	2	25	●	●

### Ordering Code (example):

Punch with tapered head 30°, Shape D = 2281.

Material MAT HSS = 3.

Shaft diameter  $d_1$  10 mm = 1000.

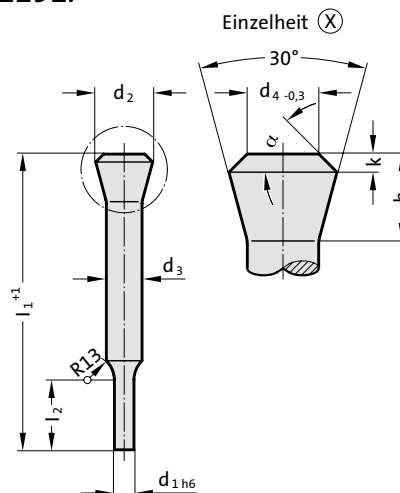
Length  $l_1$  100 mm = 100

Order No = 2281.3.1000.100

# Punch with tapered head 30°, Shape C



2291.



## 2291. Punch with tapered head 30°, Shape C

$d_3$	$d_2$	$d_4$	$h$	$k$	$\alpha \pm 1^\circ$	$l_1$	$l_2$
5.5	8.98	5.5	7.5	1	30	●	●
6	9.75	6	8	1	28	●	●
8	12.8	8	10	1	22.5	●	●
9	14.4	9	11	1	20	●	●
10	15.9	10	12	1	19	●	●
12	18.7	12	14	1.5	24	●	●
14	21.8	14	16	1.5	21	●	●
16	24.6	16	18	2	25	●	●

## Material:

HSS

Order No 2291.3.

Hardness:

Shaft 58 + 2 HRC

Head ≤ 50 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged and tempered. Shaft and head subsequently precision plunge-ground for perfect concentricity and full interchangeability with replacement punches.

$d_1$  and  $l_2$  to customer's specifications!

## Ordering Code (example):

Punch with tapered head 30°, Shape C =2291.

Material MAT HSS = 3.

Shaft diameter  $d_3$  10 mm = 1000.

Length  $l_1$  100 mm = 100.

Cutting diameter  $d_1$  5 mm = 0500.

Punch cutting length  $l_2$  5 mm = 005

Order No =2291. 3. 1000. 100.0500.005

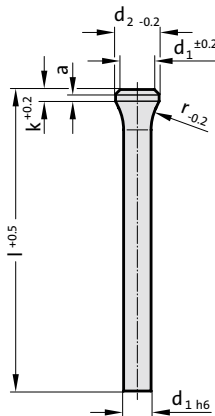




## Punch with tapered head, Shape D



2284.3.

**Material:**

HSS

Order No 2284.3.

Hardness:

Shaft 62-66 HRC

Head 45-55 HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

**Execution:**

Shaft precision ground. Head subsequently hot upset-forged and tempered.

**Note:**

Matching piloted counterbore 2284.00.

**Ordering Code (example):**

Punch with tapered head, Shape D	=2284.3.
Shaft diameter $d_1$	5.2 mm = 0520.
Length $l$	80 mm = 080
Order No	=2284.3. 0520. 080

**2284.3. Punch with tapered head, Shape D**

$d_1$	$d_2$	$a$	$k$	$r$	$l$	71	80	100	110
2	3	1	3	3.5		●	●	●	
2.1	3.2	1	3	5		●	●	●	
2.2	3.2	1	3	5		●	●	●	
2.3	3.5	1	3	5		●	●	●	
2.4	3.5	1	3	5		●	●	●	
2.5	3.5	1	3	5		●	●	●	
2.6	4	1	3	6.5		●	●	●	
2.7	4	1	3	6.5		●	●	●	
2.8	4	1	3	6.5		●	●	●	
2.9	4	1	3	6.5		●	●	●	
3.1	4.5	1	3	6.5		●	●	●	
3.2	4.5	1	3	6.5		●	●	●	
3.3	4.5	1	3	6.5		●	●	●	
3.4	4.5	1	3	6.5		●	●	●	
3.5	5	1	3	8		●	●	●	
3.6	5	1	3	8		●	●	●	
3.7	5	1	3	8		●	●	●	
3.8	5	1	3	8		●	●	●	
4.1	5.5	1.5	4	8		●	●	●	
4.2	5.5	1.5	4	8		●	●	●	
4.3	5.5	1.5	4	8		●	●	●	
4.4	5.5	1.5	4	8		●	●	●	
4.5	6	1.5	4	8		●	●	●	
4.6	6	1.5	4	8		●	●	●	
4.7	6	1.5	4	8		●	●	●	
4.8	6	1.5	4	8		●	●	●	
4.9	6	1.5	4	8		●	●	●	
5.1	7	1.5	4	10		●	●	●	
5.2	7	1.5	4	10		●	●	●	
5.5	8	1.5	4	10		●	●	●	
5.6	8	1.5	4	10		●	●	●	
6.1	9	1.5	4	10		●	●	●	
6.2	9	1.5	4	10		●	●	●	
6.3	9	1.5	4	10		●	●	●	
6.4	9	1.5	4	10		●	●	●	
6.5	10	1.5	4	12		●	●	●	●
7	10	1.5	4	12		●	●	●	●
7.5	11	1.5	4	12		●	●	●	●
7.7	11	1.5	4	12		●	●	●	●
8.1	11	1.5	4	12		●	●	●	●
8.5	13	1.5	4	15		●	●	●	●
9	13	1.5	4	15		●	●	●	●
9.5	14	1.5	4	15		●	●	●	●
10.5	15	1.5	4	15		●	●	●	●
11	15	1.5	4	15		●	●	●	●
11.5	16	1.5	4	15		●	●	●	●
12	16	1.5	4	15		●	●	●	●
12.5	17	1.5	4	15		●	●	●	●
13.5	18	1.5	4	15		●	●	●	●
14	18	1.5	4	15		●	●	●	●
14.5	19	1.5	4	15		●	●	●	●
15	19	1.5	4	15		●	●	●	●
15.5	20	1.5	4	15		●	●	●	●
17	21	1.5	4	15		●	●	●	●
18	22	1.5	4	15		●	●	●	●
19	23	1.5	4	15		●	●	●	●
19.5	25	1.5	4	15		●	●	●	●



## Assembly Guide Lines for Head Type Punches with Round Points

### Description:

Head type punches with round point (DIN 9844) are intended for floating assembly in the punch retainer. Radial guiding is to be provided by the stripper.

This type of punch assembly eliminates alignment errors caused by distorted mounting of the die set and faulty press geometry.

With punches held in this manner, a clear separation between transmission of perforation force and guiding is achieved.

In order to facilitate assembly of punches of different diameters, the height of the heads is standardized to  $4_{+0,2}$  mm (DIN 9844).

### Guide Lines:

(excerpts from DIN 9844, page 5)

$d_1$  max. = stock thickness

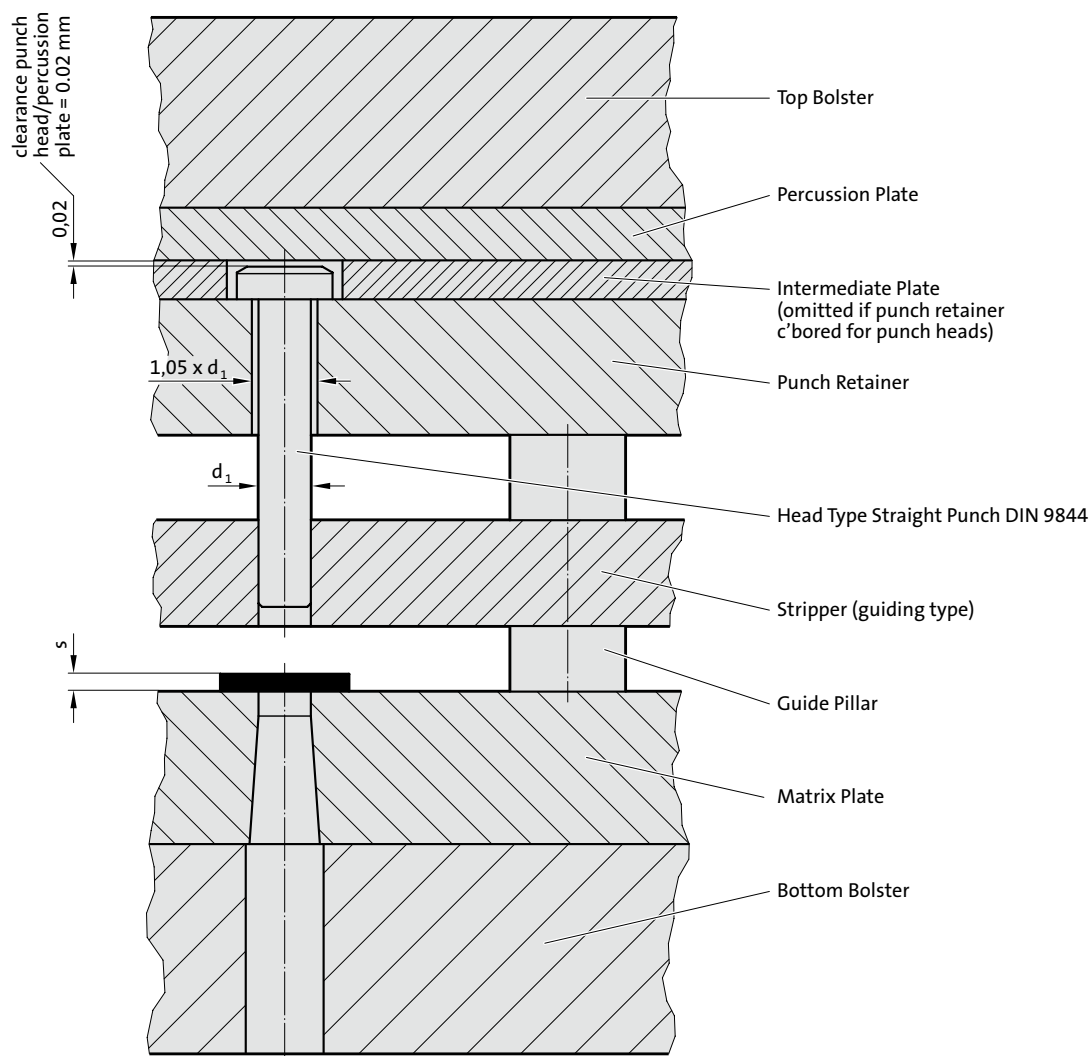
stripping force\*, for  $d_1$  from 1 to 5 mm: approx. 20 % of piercing force  
ditto . . . , for  $d_1$  from 5 to 16 mm: approx. 10 % of piercing force

\*applicable to stock not exceeding 400 N/mm<sup>2</sup> shear strength

Punch retainer: steel of at least 300 N/mm<sup>2</sup> tensile strength

Retaining hole in punch retainer = 1,05 times  $d_1$  or  $d_2$  respectively

Clearance punch head/percussion plate = 0,02 mm.

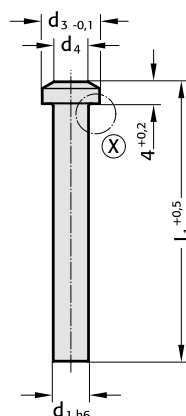
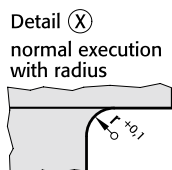


# Punch DIN 9844, Shape A



FIBRO

220.



$$d_4 = d_1^{+0,5}$$



## Material:

HSS

Order No 220.3.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

HST

Order No 220.4.

Hardness:

Surface  $\geq 950$  HV 0,3

Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged. Shaft and shoulder precision plunge-ground.

Stock lengths: 71, 90, 112 mm.

other lengths and diameters on request!

## 220. Punch DIN 9844, Shape A

Diameter steps					71	90	112
$d_1$	$d_1$	$d_3$	$r$	$l_1$			
2 - 2.2	0.1	3.6	0.2		●	●	●
2.3 - 2.5	0.1	4	0.2		●	●	●
2.6 - 2.8	0.1	4.5	0.3		●	●	●
2.9 - 3.2	0.1	5	0.3		●	●	●
3.3 - 3.5	0.1	6	0.3		●	●	●
3.6 - 4	0.1	7	0.3		●	●	●
4.1 - 4.5	0.1	8	0.5		●	●	●
4.6 - 5	0.1	8.5	0.5		●	●	●
5.1 - 5.4	0.1	9	0.5		●	●	●
5.5 - 5.9	0.1	9.5	0.5		●	●	●
6 - 6.4	0.1	10	0.5		●	●	●
6.5 - 7	0.5	10.8	0.7		●	●	●
7.5 - 8	0.5	12	0.7		●	●	●
8.5 - 9	0.5	13	0.7		●	●	●
9.5 - 10	0.5	14.5	0.7		●	●	●
10.5 - 11	0.5	16	1		●	●	●
11.5 - 12.5	0.5	18	1		●	●	●
13 - 14.5	0.5	20	1		●	●	●
15 - 16	0.5	22	1		●	●	●

## Ordering Code (example):

Punch DIN 9844, Shape A =220.

Material MAT HSS = 3.

Cutting diameter  $d_1$  5.5 mm = 0550.

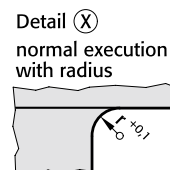
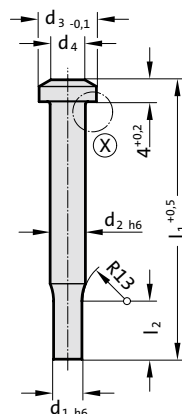
Length  $l_1$  71 mm = 071

Order No =220.3. 0550.071

# Punch DIN 9844, Shape B



221.



$$d_4 = d_1^{+0,5}$$

## 221. Punch DIN 9844, Shape B

Diameter steps										
$d_1$	$d_1$	$d_2$	$d_3$	$l_2$	$r$	$l_1$	71	90	112	
0.1 - 1.9	0.05	2	3.6	7	0.2		●	●	●	
1.95 - 2.4	0.05	2.5	4	7	0.2		●	●	●	
2.5 - 3.1	0.1	3.2	5	7	0.3		●	●	●	
3.2 - 3.9	0.1	4	7	7	0.3		●	●	●	
4 - 4.9	0.1	5	8.5	7	0.5		●	●	●	
5 - 6.2	0.1	6.3	10	7	0.5		●	●	●	
6.3 - 7.9	0.1	8	12	16	0.7		●	●	●	
8 - 9.9	0.1	10	14.5	16	0.7		●	●	●	
10 - 12.4	0.1	12.5	18	16	1		●	●	●	
12.5 - 15.9	0.1	16	22	16	1		●	●	●	

## Material:

HSS

Order No 221.3.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

HST

Order No 221.4.

Hardness:

Surface  $\geq 950$  HV 0,3

Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged. Shaft and shoulder precision plunge-ground.

Stock lengths: 71, 90, 112 mm.

other lengths and diameters on request!

## Ordering Code (example):

Punch DIN 9844, Shape B =221.

Material MAT HSS = 3.

Cutting diameter  $d_1$  5 mm = 0500.

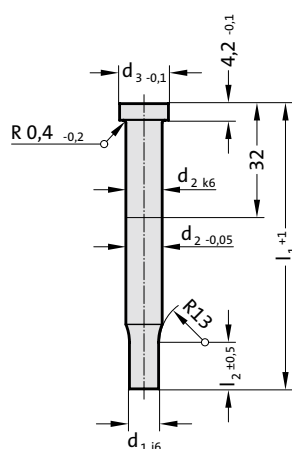
Length  $l_1$  71 mm = 071

Order No =221.3. 0500.071

## Punch similar to VDI 3374



266.



### Material:

HSS

Order No 266.3.

Hardness:

Shaft  $62 \pm 2$  HRC

Head  $45 \pm 5$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### 266. Punch similar to VDI 3374

Diameter steps							
$d_1$	$d_1$	$d_2$	$d_3$	$l_2$	$l_1^{+1}$	71	80
5 - 8.9	0.1	10	13	13		●	●
9 - 11.9	0.1	13	16	13		●	●
12 - 15.9	0.1	16	19	13		●	●
16 - 19.5	0.5	20	24	13		●	●
20 - 24.5	0.5	25	29	13		●	●

### Execution:

Head hot upset-forged. Shaft and shoulder precision plunge-ground.

Stock lengths: 71, 80 mm.

other lengths and diameters on request!

### Ordering Code (example):

Punch similar to VDI 3374 =266.

Material MAT HSS = 3.

Cutting diameter  $d_1$  12 mm = 1200.

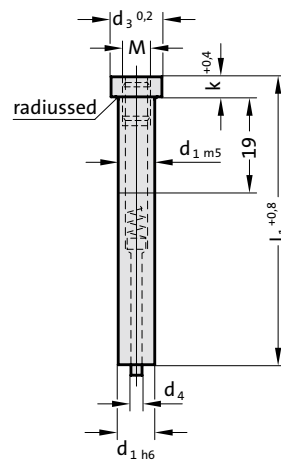
Length  $l_1$  71 mm = 071

Order No =266.3. 1200.071

# Punch with ejector pin



267.



## 267. Punch with ejector pin

$d_{1\ h6}$	$d_3$	$d_4$	$k$	$l_1$	$l_1$	$l_1$	$l_1$	$M$
5	8	0.45	5	60	71	80	90	M2.5
6	9	0.7	5	●	●	●	●	M3
8	11	1.04	5	●	●	●	●	M4
10	13	1.47	5	●	●	●	●	M5
13	16	1.47	5	●	●	●	●	M5
16	19	2.26	6.4	●	●	●	●	M6
20	23	2.26	6.4	●	●	●	●	M6
25	28	2.26	6.4	●	●	●	●	M6

## Material:

HSS

Order No 267.3.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

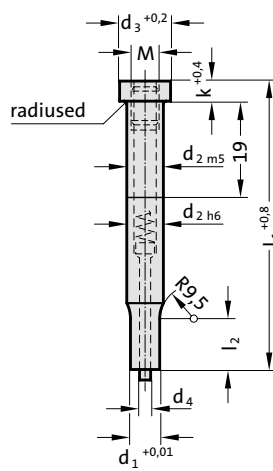
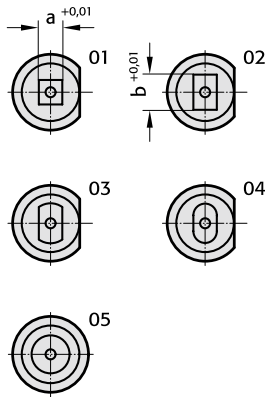
Head hot upset-forged. Shaft and shoulder precision plunge-ground.

## Ordering Code (example):

Punch with ejector pin	=267.
Material MAT	HSS = 3.
Shaft diameter $d_1$	13 mm = 1300.
Length $l_1$	60 mm = 060
Order No	=267. 3. 1300.060

## Punch with ejector pin, stepped, short point

268.



### Material:

HSS  
Order No 268.3.  
Hardness:  
Shaft  $64 \pm 2$  HRC  
Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

Head hot upset-forged. Shaft and shoulder precision plunge-ground.

Key flats parallel with longest size of shape, unless otherwise specified.

### 268. Punch with ejector pin, stepped, short point

$d_1$	$d_2$	$d_3$	$d_4$	k	$l_2$	$l_1$	$l_1$	$l_1$	$l_1$	$a_{min}$	M
						60	71	80	90		
1.6 - 4.9	5	8	0.45	5	7	●	●			1.6	M2.5
2.3 - 5.9	6	9	0.7	5	7	●	●	●	●	2.3	M3
3.2 - 7.9	8	11	1.04	5	13	●	●	●	●	3.2	M4
4.8 - 9.9	10	13	1.47	5	13	●	●	●	●	4.8	M5
4.8 - 12.9	13	16	1.47	5	13	●	●	●	●	4.8	M5
5.5 - 15.9	16	19	2.26	6.4	13	●	●	●	●	5.5	M6
5.5 - 19.9	20	23	2.26	6.4	13	●	●	●	●	5.5	M6
6.5 - 24.9	25	28	2.26	6.4	13	●	●	●	●	6.5	M6

### Ordering Code (example):

Punch with ejector pin, stepped, short point

=268.

Material MAT

HSS = 3.

Shaft diameter  $d_2$

13 mm = 1300.

Length  $l_1$

60 mm = 060.

Die shape FORM

Square = 01.

Die shape width a

4.8 mm = 0480.

Die shape length b

4.8 mm = 0480

Order No

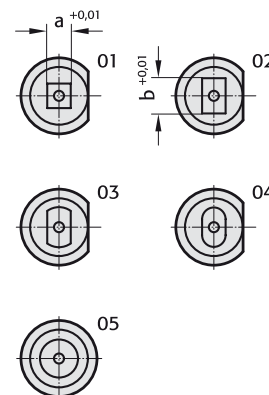
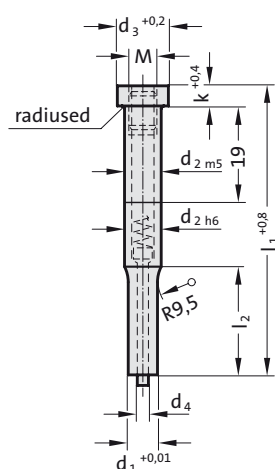
=268.3. 1300.060.01. 0480.0480



# Punch with ejector pin, stepped, long point



269.



## 269. Punch with ejector pin, stepped, long point

$d_1$	$d_2$	$d_3$	$d_4$	$k$	$l_2$	$l_1$	$l_1$	$l_1$	$l_1$	$a_{min}$	$M$
						60	71	80	90		
2.3 - 5.9	6	9	0.7	5	17.5	●	●	●	●	2.3	M3
3.2 - 7.9	8	11	1.04	5	25	●	●	●	●	3.2	M4
4.8 - 9.9	10	13	1.47	5	28	●	●	●	●	4.8	M5
4.8 - 12.9	13	16	1.47	5	28	●	●	●	●	4.8	M5
5.5 - 15.9	16	19	2.26	6.4	28	●	●	●	●	5.5	M6
5.5 - 19.9	20	23	2.26	6.4	28	●	●	●	●	5.5	M6
6.5 - 24.9	25	28	2.26	6.4	28	●	●	●	●	6.5	M6

## Material:

HSS

Order No 269.3.

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 3$  HRC

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

## Execution:

Head hot upset-forged. Shaft and shoulder precision plunge-ground.

Key flats parallel with longest size of shape, unless otherwise specified.

## Ordering Code (example):

Punch with ejector pin, stepped, long point	=269.
Material MAT	HSS = 3.
Shaft diameter $d_2$	13 mm = 1300.
Length $l_1$	60 mm = 060.
Die shape FORM	Square = 01.
Die shape width a	4.8 mm = 0480.
Die shape length b	4.8 mm = 0480
Order No	=269.3.1300.060.01. 0480.0480



# Sintered Hard Metal HIP-densified

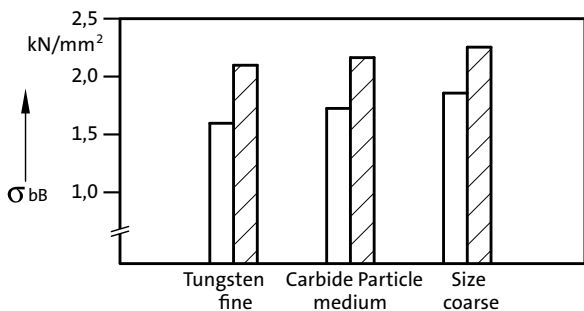
The HIP process (hot isostatic pressing) consists of a special densification treatment.

Applied after the sintering stage, this widely used process involves compacting, at very high temperature and pressure, of the carbide structure. It yields an appreciable reduction in porosity, better strength properties and thus longer die life of press tool members.

As can be seen from the diagrams and tables, both compressive and flexural strength are improved.

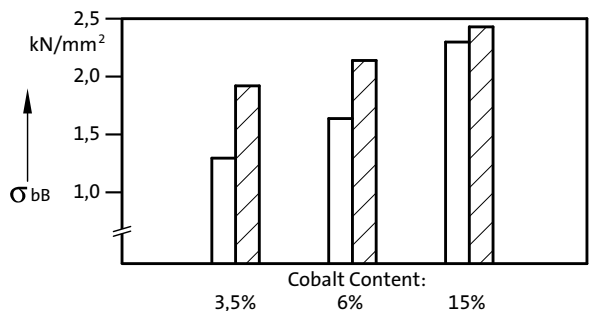
For stamping die tooling, hard metal types of medium tungsten particle size, with a cobalt content of 9 to 12%, have been found succesful in a wide field of applications.

Tensile strength of Tungsten – 6% Cobalt Carbide in the sintered-only versus HIP-densified state, in dependance of Cristallite particle size



a) influence of crystallite size of hard metal phase  
(left: sintered only – right: sintered and HIP-treated)

Tensile strength of Tungsten – Cobalt Carbide in the sintered-only versus HIP-densified state, in dependance of total Cobalt content



b) influence of cobalt content  
(left: sintered only – right: sintered and HIP-treated)

Tungsten carbide – particle size	Co %	HV <sub>30</sub> -Hardness		Flexural Strength N/mm²	
		befor	after	befor	after
fine	3	1800	no changes	1200	1700
	6	1650		1500	2300
	9	1400		2000	2600
medium	6	1600		2000	2600
	9	1450		2350	2700
	12	1300		2450	2900
coarse	15	1200		2700	2850
	6	1400		1900	2250
	8	1350		2300	2600
	10	1200		2650	2850

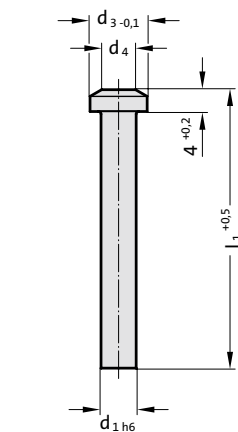
Flexural strength and HV30-hardness of Tungsten-Cobalt Carbides with/without HIP-treatment and in dependance of Tungsten Carbide particle size and Cobalt content.

# Punch similar DIN 9844, Shape A



FIBRO

270.



$$d_4 = d_1^{+0.5}$$



## Material:

Tungsten-Cobalt-Carbide  
Order No 270.9.

## Execution:

Shaft precision ground.  
Head steel, brazed to shaft or Tungsten-Cobalt Carbide.

Other diameters and lengths on request.

## 270. Punch similar DIN 9844, Shape A

Diameter steps							
d <sub>1</sub>	d <sub>1</sub>	d <sub>3</sub>	r	l <sub>1</sub>	71	90	112
1 - 2.2	0.1	3.6	0.2		●	●	●
2.3 - 2.5	0.1	4	0.2		●	●	●
2.6 - 2.8	0.1	4.5	0.3		●	●	●
2.9 - 3.2	0.1	5	0.3		●	●	●
3.3 - 3.5	0.1	6	0.3		●	●	●
3.6 - 4	0.1	7	0.3		●	●	●
4.1 - 4.5	0.1	8	0.5		●	●	●
4.6 - 5	0.1	8.5	0.5		●	●	●
5.1 - 5.4	0.1	9	0.5		●	●	●
5.5 - 5.9	0.1	9.5	0.5		●	●	●
6 - 6.4	0.1	10	0.5		●	●	●
6.5 - 7	0.5	10.8	0.7		●	●	●
7.5 - 8	0.5	12	0.7		●	●	●
8.5 - 9	0.5	13	0.7		●	●	●
9.5 - 10	0.5	14.5	0.7		●	●	●
10.5 - 11	0.5	16	1		●	●	●
11.5 - 12.5	0.5	18	1		●	●	●
13 - 14.5	0.5	20	1		●	●	●
15 - 16	0.5	22	1		●	●	●

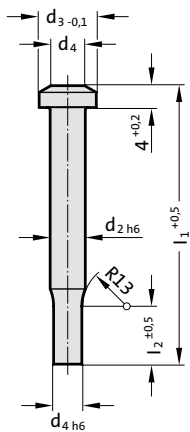
## Ordering Code (example):

Punch similar DIN 9844, Shape A	= 270.9.
Shaft diameter d <sub>1</sub>	4.7 mm = 0470.
Length l <sub>1</sub>	71 mm = 071
Order No	= 270.9. 0470.071

# Punch similar DIN 9844, Shape B



271.



$$d_4 = d_1^{+0.5}$$

## 271. Punch similar DIN 9844, Shape B

Diameter steps									
$d_1$	$d_1$	$d_2$	$d_3$	$l_2$	$r$	$l_1$	71	90	112
0.5 - 1.9	0.05	2	3.6	7	0.2		●	●	●
1.95 - 2.4	0.05	2.5	4	7	0.2		●	●	●
2.5 - 3.1	0.1	3.2	5	7	0.3		●	●	●
3.2 - 3.9	0.1	4	7	7	0.3		●	●	●
4 - 4.9	0.1	5	8.5	7	0.5		●	●	●
5 - 6.2	0.1	6.3	10	7	0.5		●	●	●
6.3 - 7.9	0.1	8	12	16	0.7		●	●	●
8 - 9.9	0.1	10	14.5	16	0.7		●	●	●
10 - 12.4	0.1	12.5	18	16	1		●	●	●
12.5 - 15.9	0.1	16	22	16	1		●	●	●

**Material:**  
Tungsten-Cobalt-Carbide  
Order No 271.9.

**Execution:**  
Shaft precision ground.  
Head steel, brazed to shaft or Tungsten-Cobalt Carbide.  
Other diameters and lengths on request.

## Ordering Code (example):

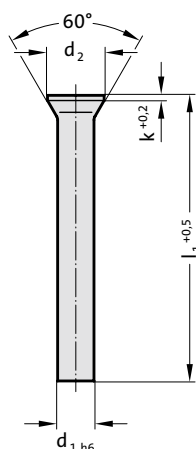
Punch similar DIN 9844, Shape B	=271.9.
Cutting diameter $d_1$	7.3 mm = 0730.
Length $l_1$	71 mm = 071
Order No	=271.9. 0730.071

## Punch similar DIN 9861, Shape D



**FIBRO**

272.



### Material:

Tungsten-Cobalt-Carbide  
Order No 272.9.

### Execution:

Shaft precision ground.  
Head steel, brazed to shaft or Tungsten-Cobalt Carbide.

Other diameters and lengths on request.

### 272. Punch similar DIN 9861, Shape D

d <sub>1</sub>	Diameter steps				l <sub>1</sub>	71	80	100
	d <sub>1</sub>	d <sub>2</sub>	k					
1.5	0.1	2.2	0.5			●	●	●
1.6 - 1.7	0.1	2.5	0.5			●	●	●
1.8 - 1.9	0.1	2.8	0.5			●	●	●
2	0.1	3	0.5			●	●	●
2.1 - 2.2	0.1	3.2	0.5			●	●	●
2.3 - 2.5	0.1	3.5	0.5			●	●	●
2.6 - 2.9	0.1	4	0.5			●	●	●
3 - 3.4	0.1	4.5	0.5			●	●	●
3.5 - 3.9	0.1	5	0.5			●	●	●
4 - 4.4	0.1	5.5	0.5			●	●	●
4.5 - 4.9	0.1	6	0.5			●	●	●
5 - 5.4	0.1	6.5	0.5			●	●	●
5.5 - 5.9	0.1	7	0.5			●	●	●
6 - 6.4	0.1	8	0.5			●	●	●
6.5 - 7	0.5	9	1			●	●	●
7.5 - 8	0.5	10	1			●	●	●
8.5 - 9	0.5	11	1			●	●	●
9.5 - 10	0.5	12	1			●	●	●
10.5 - 11	0.5	13	1			●	●	●
11.5 - 12	0.5	14	1			●	●	●
12.5 - 13	0.5	15	1			●	●	●
13.5 - 14	0.5	16	1.5			●	●	●
14.5 - 15	0.5	17	1.5			●	●	●
15.5 - 16	0.5	18	1.5			●	●	●

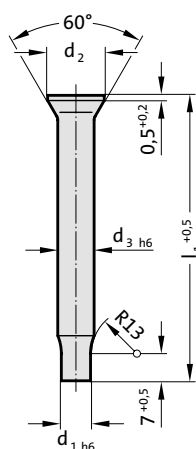
### Ordering Code (example):

Punch similar DIN 9861, Shape D	=272.9.
Shaft diameter d <sub>1</sub>	5 mm = 0500.
Length l <sub>1</sub>	71 mm = 071
Order No	=272.9.0500.071

# Punch similar DIN 9861, Shape C



273.



## 273. Punch similar DIN 9861, Shape C

Diameter steps				
$d_1$	$d_1$	$d_2$	$d_3$	$l_1$
0.5 - 1.5	0.05	3	2	71
1.55 - 2.95	0.05	4.5	3	71

## Material:

Tungsten-Cobalt-Carbide  
Order No 273.9.

## Execution:

Shaft precision ground.  
Head steel, brazed to shaft or Tungsten-Cobalt Carbide.

Other diameters and lengths on request.

## Ordering Code (example):

Punch similar DIN 9861, Shape C = 273.9.

Cutting diameter  $d_1$  1.75 mm = 0175.

Length  $l_1$  71 mm = 71

Order No = 273.9. 0175. 71



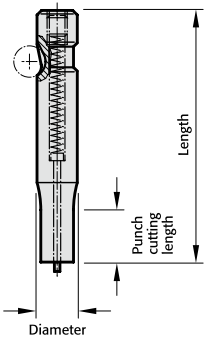
## **Ball-Lock Punches**





## Ordering example Ball-Lock Punches

**Note:** See table for standard dimensions  
Special dimensions to order



Punch:  
22 without ejector pin  
27 with ejector pin

**Version:**

Version	Order No
blank	= 0
round	= 1
square	= 2
rectangular	= 3
slot	= 4
rectangle with radiused corners	= 5
pilot pin with tapered tip	= 6
pilot pin parabolic tip	= 7
special shapes	= 9

**Type:**

Type	Order No
light	= 2
heavy	= 3
punch larger, light	= 4
punch larger, heavy	= 5

**Punch cutting length:  $l_1$**

Punch cutting length: $l_1$	Order No
13	= 1
19	= 2
25	= 3
30	= 4
special	= X

**Diameter:  $d_2$**

Diameter: $d_2$	Order No
6 (light duty only)	= 1
10	= 2
13	= 3
16	= 4
20	= 5
25	= 6
32	= 7
38 (light duty only)	= 8
40 (heavy duty only)	= 9

**Length:  $l$**

Length: $l$	Order Code character
50	= A
56	= B
63	= C
71	= D
80	= E
90	= F
100	= G
110	= H
125	= J
140	= K
150	= L
175	= M
200	= N
special	= X

**Format: Slot length  $P = 6,5$  mm**

**Format: Slot width  $W = 4,5$  mm**

**Angle:**

Angle	Order Code character
0°	= A
90°	= B
180°	= C
270°	= D
special	= X

### Ordering Code (Example):

2 2 4 2 . 2 F 1 . 0 6 5 0 . 0 4 5 0 B

Angle = 90° (B)

Format: Slot, width  $W = 4,5$  mm (0450)

Format: Slot, length  $P = 6,5$  mm (0650)

Punch cutting length:  $l_1 = 13$  mm (1)

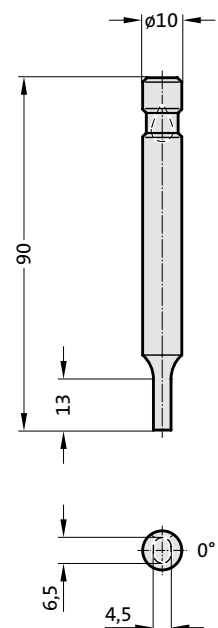
Length:  $l = 90$  mm (F)

Diameter:  $d_2 = 10$  mm (2)

Type = light (2)

Version: Slot (4)

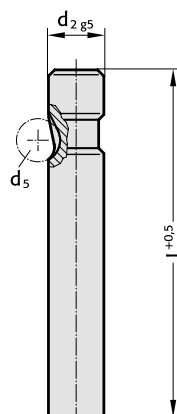
Punch: without ejector pin (22)





## Ball lock punch, blank, light duty

2202.

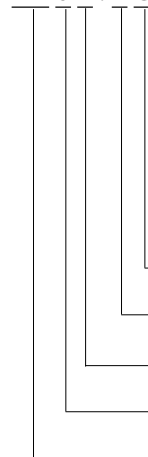


### 2202. Ball lock punch, blank, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)	140 (K)	150 (L)	175 (M)	200 (N)
6 / (1)	6		•	•	•	•	•	•	•	•	•	•	•
10 / (2)	8		•	•	•	•	•	•	•	•	•	•	•
13 / (3)	8		•	•	•	•	•	•	•	•	•	•	•
16 / (4)	8		•	•	•	•	•	•	•	•	•	•	•
20 / (5)	8		•	•	•	•	•	•	•	•	•	•	•
25 / (6)	8		•	•	•	•	•	•	•	•	•	•	•
32 / (7)	8		•	•	•	•	•	•	•	•	•	•	•
38 / (8)	8		•	•	•	•	•	•	•	•	•	•	•

### Ordering code (example):

2 2 0 2 . 7 G



#### Length: l

100 mm

#### Diameter: d<sub>2</sub>

32 mm

#### Type:

light

#### Version:

blank

#### Punch:

without ejector pin

#### Order Code character

= (G)

#### Order No

= (7)

#### Order No

= (2)

#### Order No

= (0)

= 22

### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

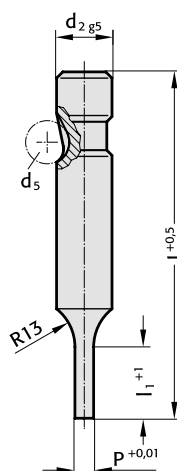
Shaft fine ground.

Special dimensions on request.

# Ball lock punch, stepped, round, light duty



2212.



## 2212. Ball lock punch, stepped, round, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1,6-5,9	13 (1)		●	●	●	●	●
10 / (2)	8	1,6-9,9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	5,0-12,9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	8,0-15,9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	12,0-19,9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	16,0-24,9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	24,0-31,9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	30,0-37,9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Material:

HSS

Hardness 62 ± 2 HRC

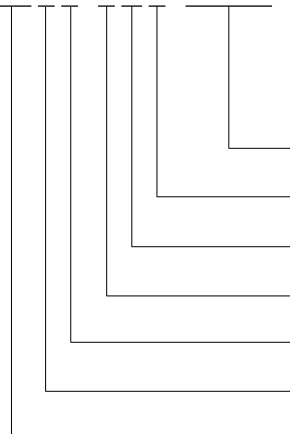
### Execution:

Shaft and punch diameter fine ground.

Special dimensions on request.

### Ordering-code (example):

2 2 1 2 . 7 G 2 . 2 4 5 0



#### Format: Round

P = ø24,5 mm

Punch cutting length: l<sub>1</sub>

19 mm

length: l

100 mm

diameter: d<sub>2</sub>

32 mm

Type:

light

Version:

Round

Punch:

without ejector pin

= 2450

Order No

= (2)

Order code character

= (G)

Order No

= (7)

Order No

= (2)

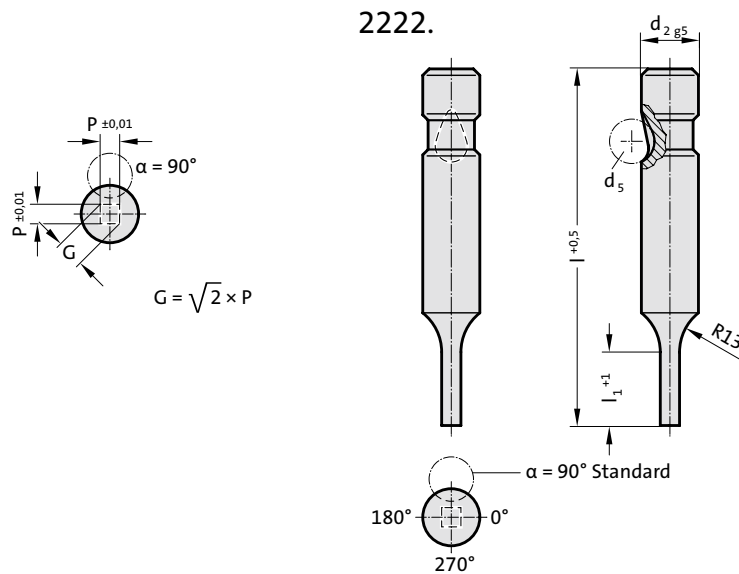
Order No

= (1)

= 22



## Ball lock punch, stepped, square, light duty



### 2222. Ball lock punch, stepped, square, light duty

$d_2$ / (Order No)	$d_5$	$P_{min}$	$G_{max}$	$L_1$ / (Order No)*	$L$ / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\* $L_1=10$  where  $P < 2.20$

### Ordering-code (example):

2 2 2 2 . 2 F 1 . 0 6 5 0 B

Angle:  
90°

Format: Square, length P  
P = 6,5 mm  
Punch cutting length:  $L_1$   
13 mm  
Length: L  
90 mm  
Diameter:  $d_2$   
10 mm  
Type:  
light  
Version:  
Square  
Punch:  
without ejector pin

Order code character  
= (B)

= 0650  
Order No  
= (1)  
Order code character  
= (F)  
Order No  
= (2)  
Order No  
= (2)  
Order No  
= (2)  
= 22

### Material:

HSS  
Hardness  $62 \pm 2$  HRC

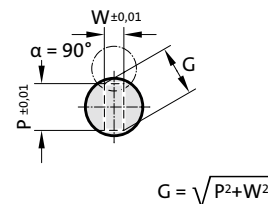
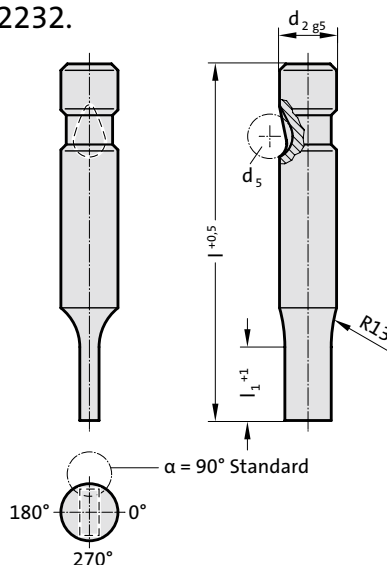
### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

# Ball lock punch, stepped, rectangular, light duty



2232.



## 2232. Ball lock punch, stepped, rectangular, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where W < 2.20

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

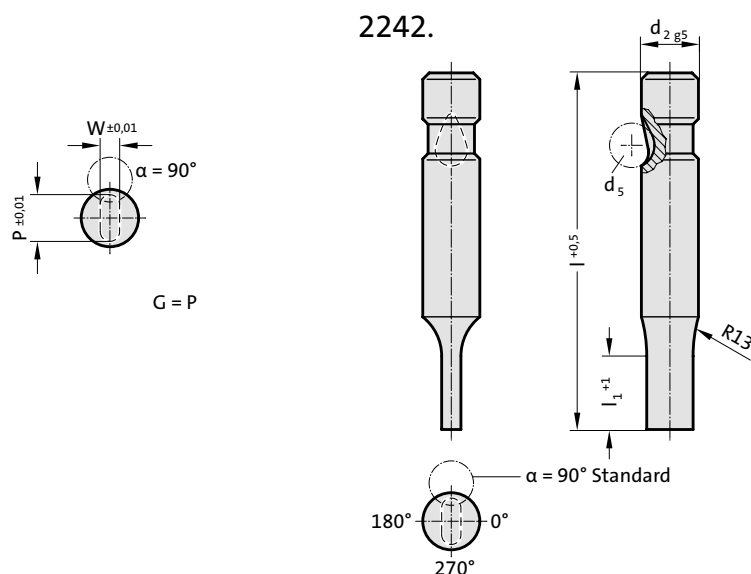
### Ordering-code (example):

2232.2F1.0650.0450B

	<b>Angle:</b>	<b>Order code character</b>
	90°	= (B)
	<b>Format: Rectangular, width W</b>	
	W = 4,5 mm	= 0450
	<b>Format: Rectangular, length P</b>	
	P = 6,5 mm	= 0650
	<b>Punch cutting length: l<sub>1</sub></b>	<b>Order No</b>
	13 mm	= (1)
	<b>Length: l</b>	<b>Order code character</b>
	90 mm	= (F)
	<b>Diameter: d<sub>2</sub></b>	<b>Order No</b>
	10 mm	= (2)
	<b>Type:</b>	<b>Order No</b>
	light	= (2)
	<b>Version:</b>	<b>Order No</b>
	Rectangular	= (3)
	<b>Punch:</b>	
	without ejector pin	= 22



## Ball lock punch, stepped, slot, light duty



## 2242. Ball lock punch, stepped, slot, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where W < 2.20

## Ordering-code (example):

2 2 4 2 . 2 F 1 . 0 6 5 0 . 0 4 5 0 B

Angle  
90°

Format: Slot, width W  
W = 4,5 mm

Format: Slot, length P  
P = 6,5 mm

Punch cutting length: l<sub>1</sub>  
13 mm

Length: l  
90 mm

Diameter: d<sub>2</sub>  
10 mm

Type:  
light

Version:  
Slot

Punch:  
without ejector pin

Order code character  
= (B)

= 0450

= 0650

Order No

= (1)

Order code character

= (F)

Order No

= (2)

Order No

= (2)

Order No

= (4)

= 22

## Material:

HSS  
Hardness 62 ± 2 HRC

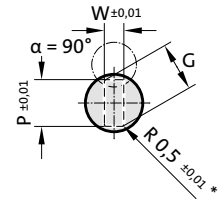
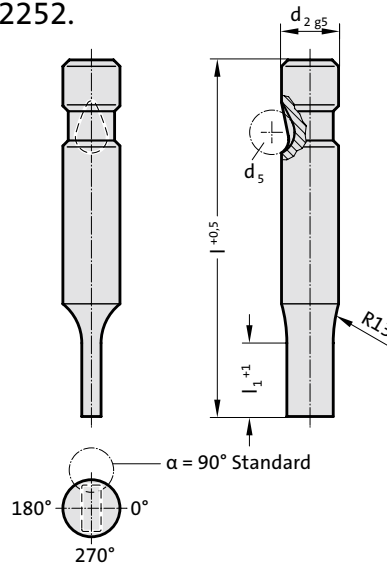
## Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

## Ball lock punch, stepped, rectangle with radiussed corners, light duty



2252.



$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2} + 1$$



2252. Ball lock punch, stepped, rectangle with radiussed corners, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\* $l_1=10$  where  $W < 2.20$

Material:

HSS  
Hardness  $62 \pm 2$  HRC

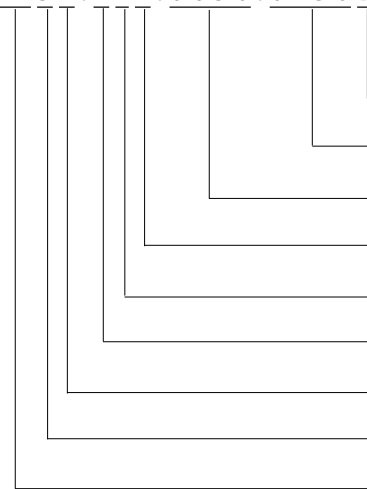
Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

\* For other radius options, see standardised special shapes.

Ordering-code (example):

2252.2F1.0650.0450B

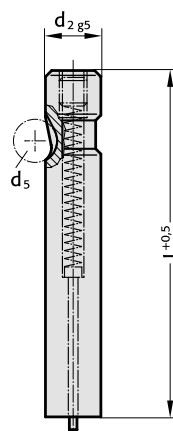


<b>Angle:</b>	<b>Order code character</b>
90°	= (B)
<b>Format: Rectangle with radiused corners, width W</b>	
W = 4,5 mm	= 0450
<b>Format: Rectangle with radiused corners, length P</b>	
P = 6,5 mm	= 0650
<b>Punch cutting length: l<sub>1</sub></b>	<b>Order No</b>
13 mm	= (1)
<b>Length: l</b>	<b>Order code character</b>
90 mm	= (F)
<b>Diameter: d<sub>2</sub></b>	<b>Order No</b>
10 mm	= (2)
<b>Type:</b>	<b>Order No</b>
light	= (2)
<b>Version:</b>	<b>Order No</b>
Rectangle with radiused corners	= (5)
<b>Punch:</b>	
without ejector pin	= 22



# Ball lock punch, blank, with ejector pin, light duty

2702.



## 2702. Ball lock punch, blank, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6		●	●	●	●	●
10 / (2)	8		●	●	●	●	●
13 / (3)	8		●	●	●	●	●
16 / (4)	8		●	●	●	●	●
20 / (5)	8		●	●	●	●	●
25 / (6)	8		●	●	●	●	●
32 / (7)	8			●	●	●	●
38 / (8)	8				●	●	●

## Ordering-code (example):

2 7 0 2 . 7 G

Length: l  
100 mm  
Diameter: d<sub>2</sub>  
32 mm  
Type:  
light  
Version:  
blank  
Punch:  
with ejector pin

Order code character  
= (G)  
Order No  
= (7)  
Order No  
= (2)  
Order No  
= (0)  
= 27

## Material:

HSS  
Hardness 62 ± 2 HRC

## Execution:

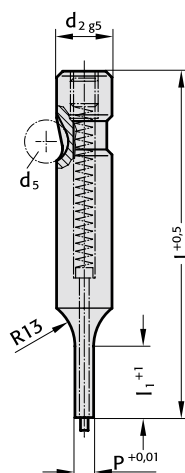
Shaft fine ground.  
Special dimensions on request.



# Ball lock punch, stepped, round, with ejector pin, light duty



2712.



## 2712. Ball lock punch, stepped, round, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1,6-5,9	13 (1)		●	●	●	●	●
10 / (2)	8	1,6-9,9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	5,0-12,9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	8,0-15,9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	12,0-19,9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	16,0-24,9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	24,0-31,9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	30,0-37,9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Material:

HSS

Hardness 62 ± 2 HRC

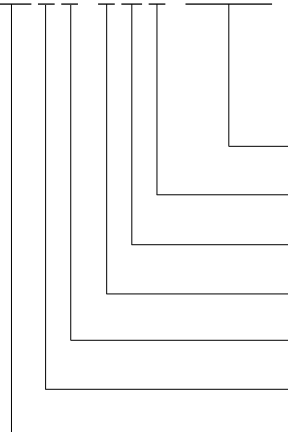
### Execution:

Shaft and punch diameter fine ground.

Special dimensions on request.

### Ordering-code (example):

2 7 1 2 . 7 G 2 . 2 4 5 0



**Format: Round**

P = ø24,5 mm

**Punch cutting length: l<sub>1</sub>**

19 mm

**length: l**

100 mm

**diameter: d<sub>2</sub>**

32 mm

**Type:**

light

**Version:**

Round

**Punch:**

with ejector pin

= 2450

**Order No**

= (2)

**Order code character**

= (G)

**Order No**

= (7)

**Order No**

= (2)

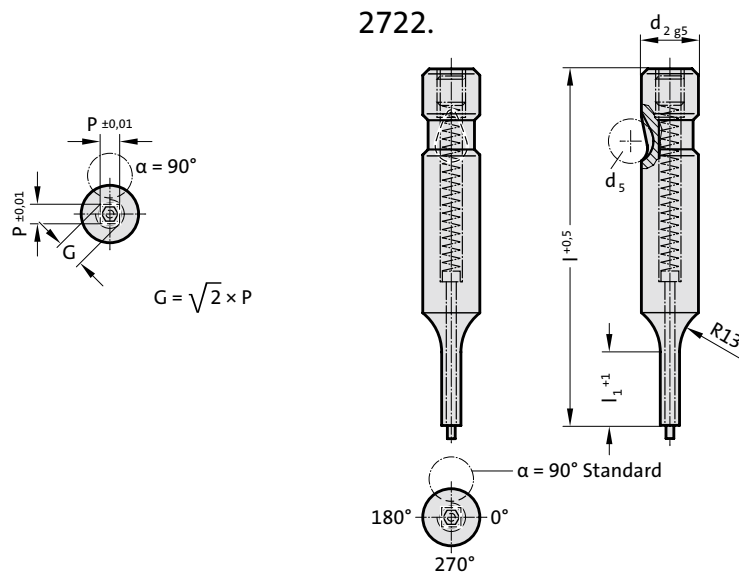
**Order No**

= (1)

= 27



# Ball lock punch, stepped, square, with ejector pin, light duty



## 2722. Ball lock punch, stepped, square, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Ordering-code (example):

2722.2E1.0650 A

Angle:  
0°

Format: Square, length P  
P = 6,5 mm

Punch cutting length: l<sub>1</sub>  
13 mm

Length: l  
80 mm

Diameter: d<sub>2</sub>  
10 mm

Type:  
light

Version:  
Square

Punch:  
with ejector pin

Order code character  
= (A)

= 0650

Order No  
= (1)

Order code character  
= (E)

Order No  
= (2)

Order No  
= (2)

Order No  
= (2)

= 27

### Material:

HSS  
Hardness 62 ± 2 HRC

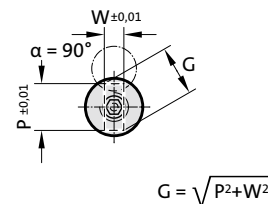
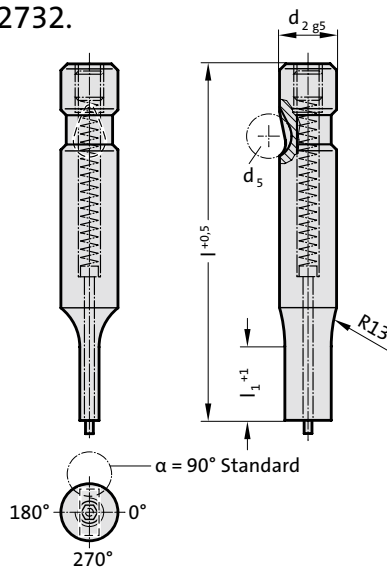
### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

# Ball lock punch, stepped, rectangular, with ejector pin, light duty



2732.



## 2732. Ball lock punch, stepped, rectangular, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where W < 2.20

### Material:

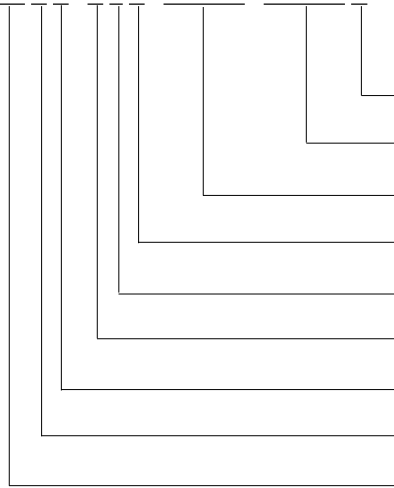
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

### Ordering-code (example):

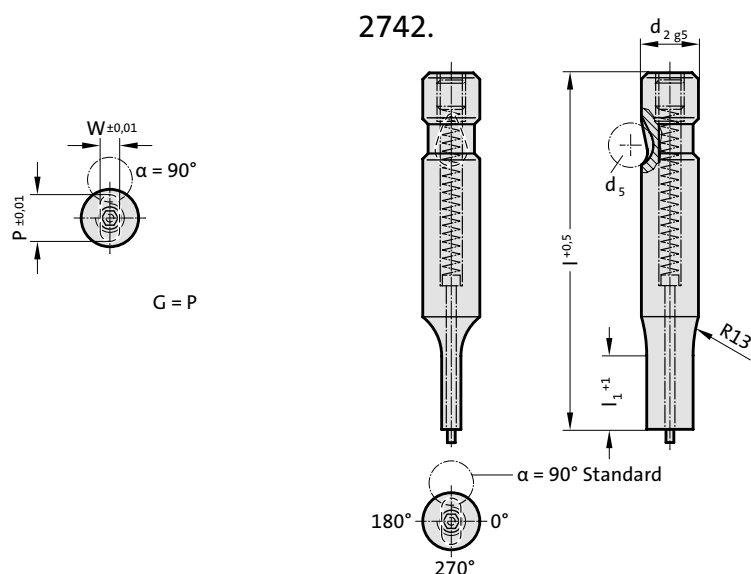
2732.2F1.0650.0450B



<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 4,5 mm	= 0450
<b>Format: Rectangular, length P</b> P = 6,5 mm	= 0650
<b>Punch cutting length: l<sub>1</sub></b> 13 mm	<b>Order No</b> = (1)
<b>Length: l</b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: d<sub>2</sub></b> 10 mm	<b>Order No</b> = (2)
<b>Type:</b> light	<b>Order No</b> = (2)
<b>Version:</b> Rectangular	<b>Order No</b> = (3)
<b>Punch:</b> with ejector pin	= 27



## Ball lock punch, stepped, slot, with ejector pin, light duty



## 2742. Ball lock punch, stepped, slot, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\*l<sub>1</sub>=10 where W < 2.20

## Ordering-code (example):

2742.2F1.0650.0450B

Angle  
90°

Format: Slot, width W  
W = 4,5 mm

Format: Slot, length P  
P = 6,5 mm

Punch cutting length: l<sub>1</sub>  
13 mm

Length: l  
90 mm

Diameter: d<sub>2</sub>  
10 mm

Type:  
light

Version:  
Slot

Punch:  
with ejector pin

Order code character  
= (B)

= 0450

= 0650

Order No

= (1)

Order code character

= (F)

Order No

= (2)

Order No

= (2)

Order No

= (4)

= 27

## Material:

HSS  
Hardness 62 ± 2 HRC

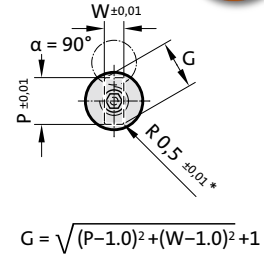
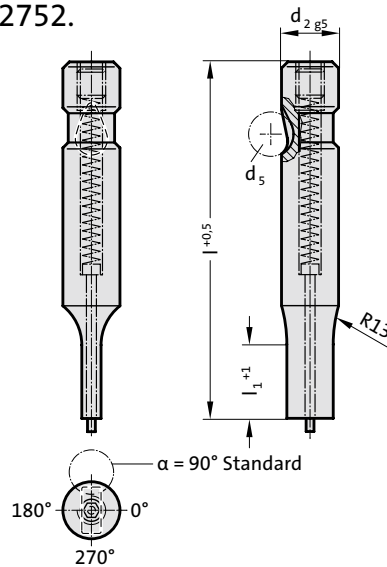
## Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

Ball lock punch, stepped, rectangle with radiussed corners, with ejector pin, light duty



2752.



$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2 + 1}$$

2752. Ball lock punch, stepped, rectangle with radiussed corners, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	1.6	5.9	13 (1)		●	●	●	●	●
10 / (2)	8	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●
13 / (3)	8	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●
16 / (4)	8	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
20 / (5)	8	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
25 / (6)	8	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
32 / (7)	8	12.5	31.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●
38 / (8)	8	14	37.9	19 (2) 25 (3) 30 (4)				●	●	●

\* $l_1=10$  where  $W < 2.20$

Material:

HSS  
Hardness  $62 \pm 2$  HRC

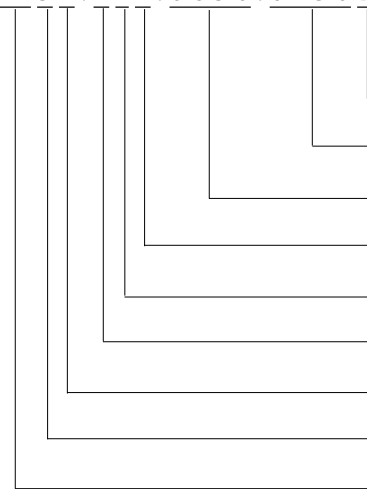
Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

\* For other radius options, see standardised special shapes.

Ordering-code (example):

2752.2F1.0650.0450B

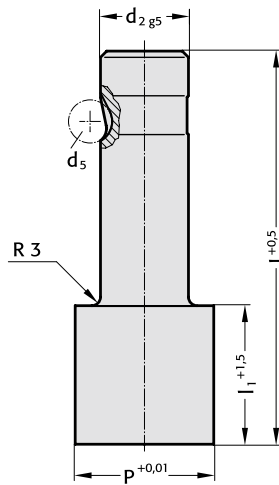
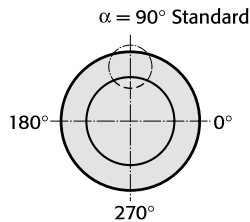


<b>Angle:</b>	<b>Order code character</b>
90°	= (B)
<b>Format: Rectangle with radiused corners, width W</b>	
W = 4,5 mm	= 0450
<b>Format: Rectangle with radiused corners, length P</b>	
P = 6,5 mm	= 0650
<b>Punch cutting length: l<sub>1</sub></b>	<b>Order No</b>
13 mm	= (1)
<b>Length: l</b>	<b>Order code character</b>
90 mm	= (F)
<b>Diameter: d<sub>2</sub></b>	<b>Order No</b>
10 mm	= (2)
<b>Type:</b>	<b>Order No</b>
light	= (2)
<b>Version:</b>	<b>Order No</b>
Rectangle with radiused corners	= (5)
<b>Punch:</b>	
with ejector pin	= 27



## Ball lock punch, punch larger than shaft, blank, light duty

2204.

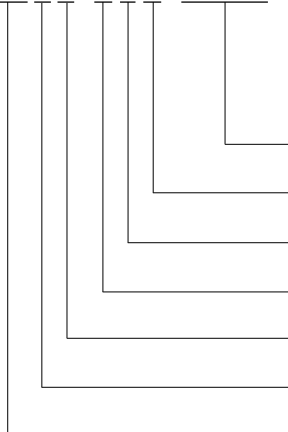


### 2204. Ball lock punch, punch larger than shaft, blank, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	50	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2 2 0 4 . 4 F 4 . 3 8 0 0



#### Format: Round

P =  $\varnothing$ 38,0 mm

Punch cutting length: l<sub>1</sub>

30 mm

length: l

90 mm

diameter: d<sub>2</sub>

16 mm

Type:

punch larger, light duty

Version:

Blank

Punch:

without ejector pin

= 3800

Order No

= (4)

Order code character

= (F)

Order No

= (4)

Order No

= (4)

Order No

= (0)

= 22

### Material:

HSS

Hardness 62  $\pm$  2 HRC

### Execution:

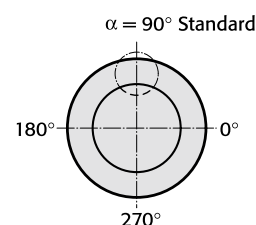
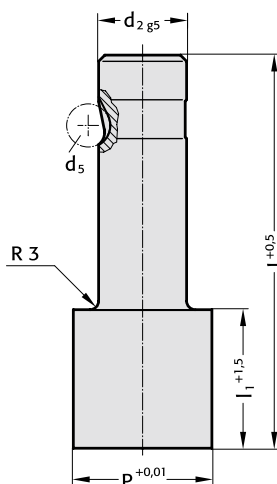
Shaft and punch diameter fine ground.

Special dimensions on request.

# Ball lock punch, punch larger than shaft, round, light duty



2214.



2214. Ball lock punch, punch larger than shaft, round, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	13 - 32	19 (2) 30 (4)		●	●	●
16 / (4)	8	16 - 38	19 (2) 30 (4)		●	●	●
20 / (5)	8	20 - 40	19 (2) 30 (4)		●	●	●
25 / (6)	8	25 - 44	19 (2) 30 (4)		●	●	●
32 / (7)	8	32 - 50	19 (2) 30 (4)		●	●	●

## Material:

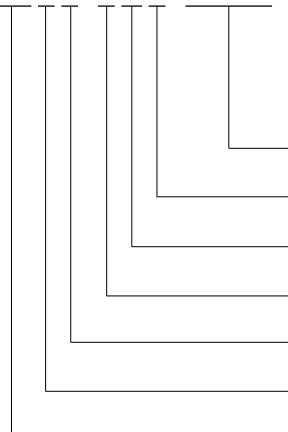
HSS  
Hardness 62 ± 2 HRC

## Execution:

Shaft and punch diameter fine ground.  
Special dimensions on request.

## Ordering-code (example):

2 2 1 4 . 7 G 2 . 3 8 0 0

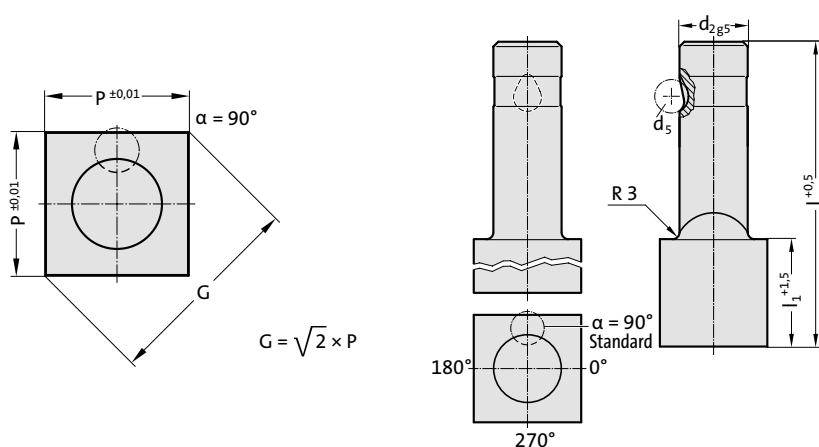


**Format:** Round  
P = Ø 38,0 mm  
**Punch cutting length:** l<sub>1</sub>  
19 mm  
**length:** l  
100 mm  
**diameter:** d<sub>2</sub>  
32 mm  
**Type:**  
punch larger, light duty  
**Version:**  
Round  
**Punch:**  
without ejector pin

= 3800  
**Order No**  
= (2)  
**Order code character**  
= (G)  
**Order No**  
= (7)  
**Order No**  
= (4)  
**Order No**  
= (1)  
= 22

# Ball lock punch, punch larger than shaft, square, light duty

2224.



## 2224. Ball lock punch, punch larger than shaft, square, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	9.19	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	11.31	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	14.14	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	17.68	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	22.63	50	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2 2 2 4 . 7 F 2 . 3 5 3 5 A

Angle:  
0°

Format: Square, length P  
P = 35,35 mm  
Punch cutting length: l<sub>1</sub>  
19 mm  
Length: l  
90 mm  
Diameter: d<sub>2</sub>  
32 mm  
Type:  
punch larger, light duty  
Version:  
Square  
Punch:  
without ejector pin

Order code character  
= (A)

= 3535  
Order No  
= (2)  
Order code character  
= (F)  
Order No  
= (7)  
Order No  
= (4)  
Order No  
= (2)  
= 22

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

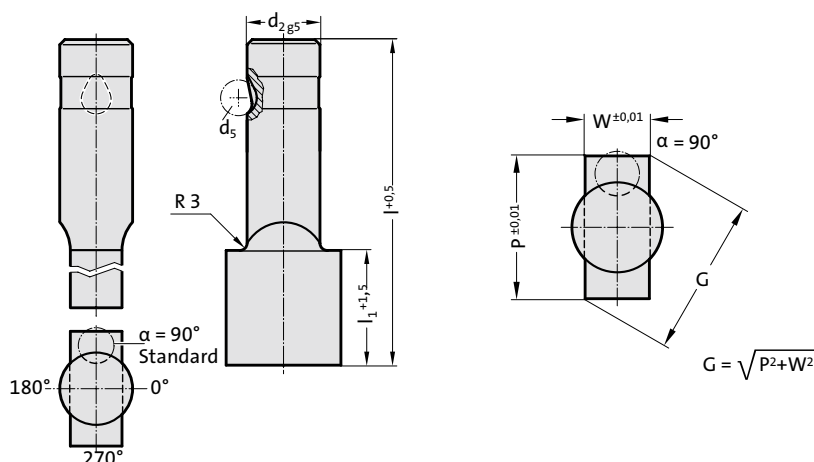
Shaft and punch shape fine ground.  
Special dimensions on request.



## Ball lock punch, punch larger than shaft, rectangular, light duty



2234.



### 2234. Ball lock punch, punch larger than shaft, rectangular, light duty

$d_2$ / (Order No)	$d_5$	$W_{min}$	$G_{max}$	$l_1$ / (Order No)	$l$ / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	11.5	50	19 (2) 30 (4)		●	●	●

#### Material:

HSS  
Hardness  $62 \pm 2$  HRC

#### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

#### Ordering-code (example):

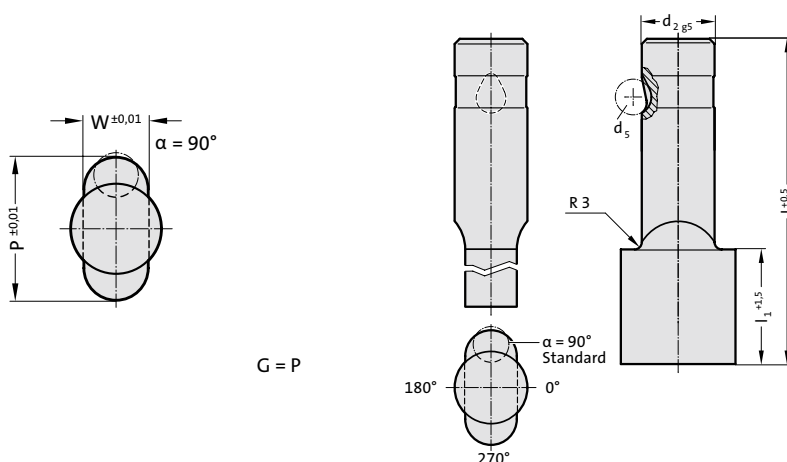
2234.7F2.3800.1150B

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## Ball lock punch, punch larger than shaft, slot, light duty

2244.



### 2244. Ball lock punch, punch larger than shaft, slot, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	11.5	50	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2 2 4 4 . 4 F 2 . 3 8 0 0 . 0 6 5 0 B

Angle  
90°  
Format: Slot, width W  
W = 6,5 mm  
Format: Slot, length P  
P = 38,0 mm  
Punch cutting length: l<sub>1</sub>  
19 mm  
Length: l  
90 mm  
Diameter: d<sub>2</sub>  
16 mm  
Type:  
punch larger, light duty  
Version:  
Slot  
Punch:  
without ejector pin

Order code character  
= (B)

= 0650

= 3800

Order No

= (2)

Order code character

= (F)

Order No

= (4)

Order No

= (4)

Order No

= (4)

Order No

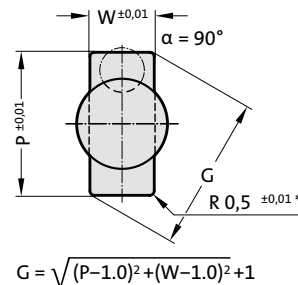
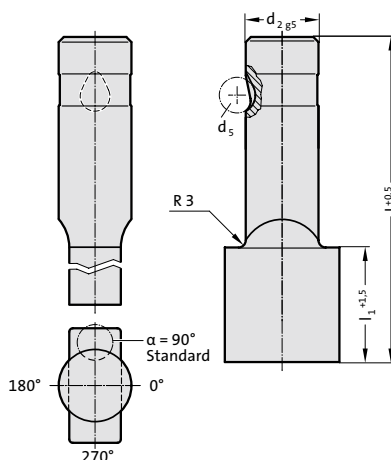
= 22

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

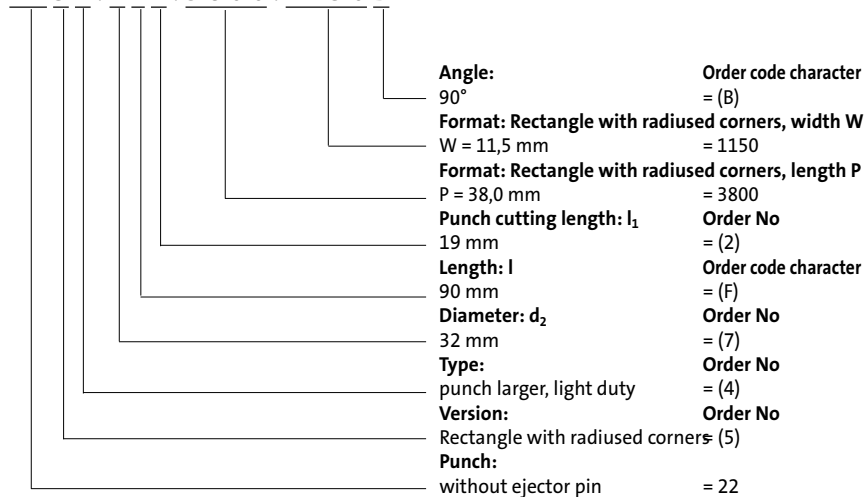


2254. Ball lock punch, punch larger than shaft, rectangle with radiussed corners, light duty

$d_2$ / (Order No)	$d_5$	$W_{\min}$	$G_{\max}$	$l_1$ / (Order No)	$l$ / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	11.5	50	19 (2) 30 (4)		●	●	●

\* For other radius options, see standardised special shapes.

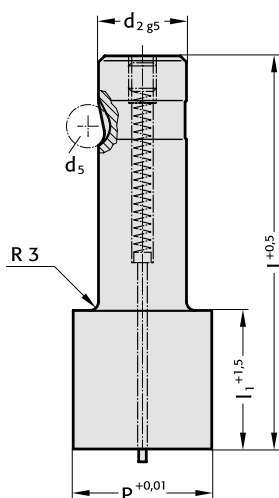
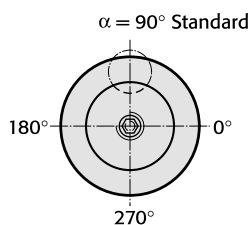
2254.7F2.3800.1150B



# Ball lock punch, punch larger than shaft, blank, with ejector pin, light duty



2704.

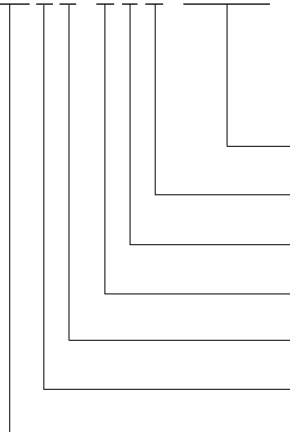


## 2704. Ball lock punch, punch larger than shaft, blank, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	50	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2704.4F4.3800


**Format: Round**

P = ø38,0 mm

**Punch cutting length: l<sub>1</sub>**

30 mm

**length: l**

90 mm

**diameter: d<sub>2</sub>**

16 mm

**Type:**

punch larger, light duty

**Version:**

Blank

**Punch:**

with ejector pin

= 3800

**Order No**

= (4)

**Order code character**

= (F)

**Order No**

= (4)

**Order No**

= (4)

**Order No**

= (0)

= 27

**Material:**

HSS

Hardness 62 ± 2 HRC

**Execution:**

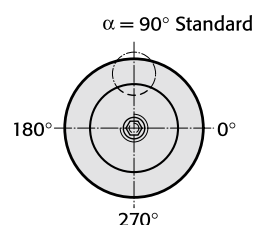
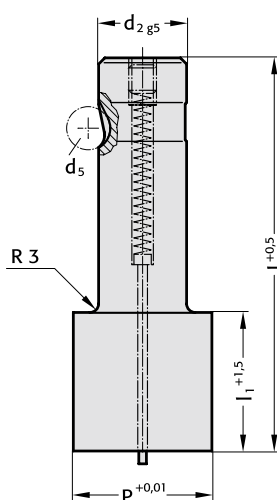
Shaft and punch diameter fine ground.

Special dimensions on request.

# Ball lock punch, punch larger than shaft, round, with ejector pin, light duty



2714.



## 2714. Ball lock punch, punch larger than shaft, round, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	13 - 32	19 (2) 30 (4)		●	●	●
16 / (4)	8	16 - 38	19 (2) 30 (4)		●	●	●
20 / (5)	8	20 - 40	19 (2) 30 (4)		●	●	●
25 / (6)	8	25 - 44	19 (2) 30 (4)		●	●	●
32 / (7)	8	32 - 50	19 (2) 30 (4)		●	●	●

### Material:

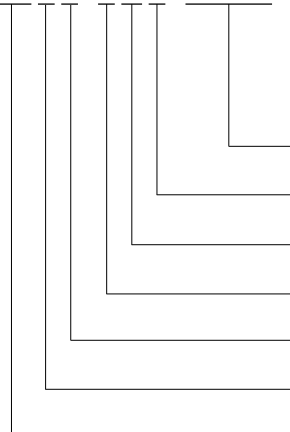
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch diameter fine ground.  
Special dimensions on request.

### Ordering-code (example):

2 7 1 4 . 7 G 2 . 4 2 5 0



#### Format: Round

P = Ø 42,5 mm

Punch cutting length: l<sub>1</sub>

19 mm

length: l

100 mm

diameter: d<sub>2</sub>

32 mm

Type:

punch larger, light duty

Version:

Round

Punch:

with ejector pin

= 4250

Order No

= (2)

Order code character

= (G)

Order No

= (7)

Order No

= (4)

Order No

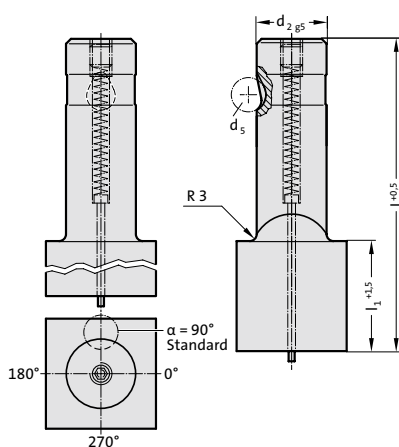
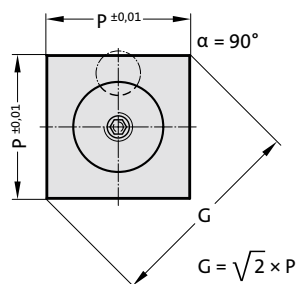
= (1)

= 27

# Ball lock punch, punch larger than shaft, square, with ejector pin, light duty



2724.



## 2724. Ball lock punch, punch larger than shaft, square, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	9.19	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	11.31	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	14.14	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	17.68	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	22.63	50	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2724.5E2.2828A

Angle:  
0°

Format: Square, length P  
P = 28,28 mm  
Punch cutting length: l<sub>1</sub>  
19 mm  
Length: l  
80 mm  
Diameter: d<sub>2</sub>  
20 mm  
Type:  
punch larger, light duty  
Version:  
Square  
Punch:  
with ejector pin

Order code character  
= (A)

= 2828  
Order No  
= (2)  
Order code character  
= (E)  
Order No  
= (5)  
Order No  
= (4)  
Order No  
= (2)  
= 27

### Material:

HSS  
Hardness 62 ± 2 HRC

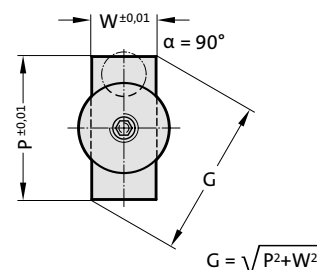
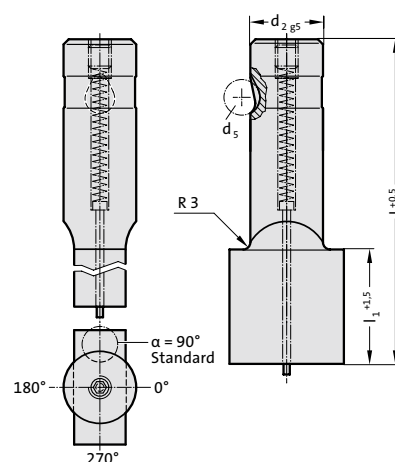
### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

## Ball lock punch, punch larger than shaft, rectangular, with ejector pin, light duty



2734.



2734. Ball lock punch, punch larger than shaft, rectangular, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	11.5	50	19 (2) 30 (4)		●	●	●

### Material:

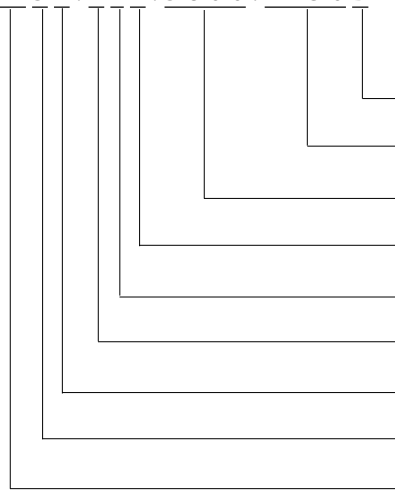
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

### Ordering-code (example):

2734.7F2.3800.1150B

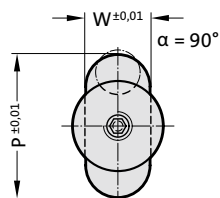


<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 11,5 mm	= 1150
<b>Format: Rectangular, length P</b> P = 38 mm	= 3800
<b>Punch cutting length: l<sub>1</sub></b> 19 mm	<b>Order No</b> = (2)
<b>Length: l</b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: d<sub>2</sub></b> 32 mm	<b>Order No</b> = (7)
<b>Type:</b> punch larger, light duty	<b>Order No</b> = (4)
<b>Version:</b> Rectangular	<b>Order No</b> = (3)
<b>Punch:</b> with ejector pin	= 27

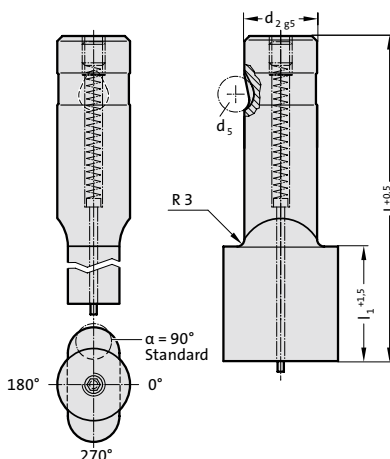
# Ball lock punch, punch larger than shaft, slot, with ejector pin, light duty



2744.



G = P



## 2744. Ball lock punch, punch larger than shaft, slot, with ejector pin, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	11.5	50	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2744.7F2.3800.1150B

Angle  
90°  
Format: Slot, width W  
W = 11,5 mm  
Format: Slot, length P  
P = 38,0 mm  
Punch cutting length: l<sub>1</sub>  
19 mm  
Length: l  
90 mm  
Diameter: d<sub>2</sub>  
32 mm  
Type:  
punch larger, light duty  
Version:  
Slot  
Punch:  
with ejector pin

Order code character  
= (B)

= 1150

= 3800

Order No

= (2)

Order code character

= (F)

Order No

= (7)

Order No

= (4)

Order No

= (4)

= 27

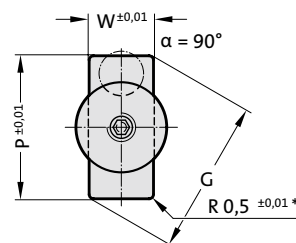
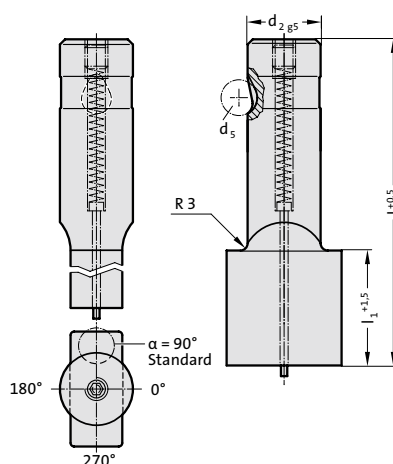
### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

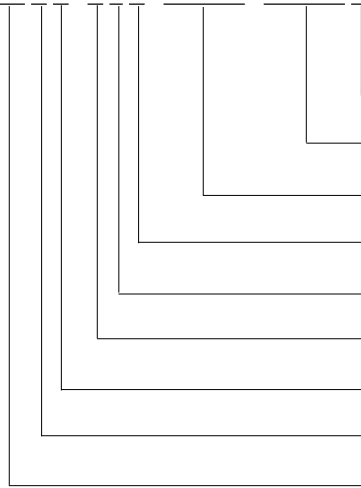




$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2 + 1}$$

$d_2$ / (Order No)	$d_5$	$W_{\min}$	$G_{\max}$	$l_1$ / (Order No)	$l$ / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	8	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	8	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	8	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	8	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	8	11.5	50	19 (2) 30 (4)		●	●	●

2754.7F2.3800.1150B

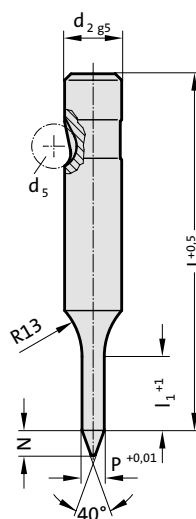


<b>Angle:</b>	Order code character
90°	= (B)
<b>Format:</b> Rectangle with radiused corners, width W	
W = 11,5 mm	= 1150
<b>Format:</b> Rectangle with radiused corners, length P	
P = 38,0 mm	= 3800
<b>Punch cutting length:</b> l <sub>1</sub>	Order No
19 mm	= (2)
<b>Length:</b> l	Order code character
90 mm	= (F)
<b>Diameter:</b> d <sub>2</sub>	Order No
32 mm	= (7)
<b>Type:</b>	Order No
punch larger, light duty	= (4)
<b>Version:</b>	Order No
Rectangle with radiused corners	= (5)
<b>Punch:</b>	
with ejector pin	= 27



## Ball lock pilot pin, with tapered tip, light duty

2262.

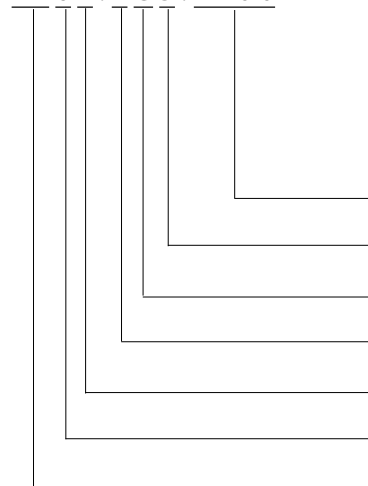


### 2262. Ball lock pilot pin, with tapered tip, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	L <sub>1</sub> / (Order No)	N	I / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)	140 (K)	150 (L)
10 / (2)	8	5.9 - 9.9	19 (2)	8		●	●	●	●	●			
13 / (3)	8	9.9 - 12.9	19 (2)	10		●	●	●	●	●	●	●	
16 / (4)	8	12.9 - 15.9	25 (3)	15		●	●	●	●	●	●	●	●
20 / (5)	8	15.9 - 19.9	25 (3)	20		●	●	●	●	●	●	●	●
25 / (6)	8	19.9 - 24.9	25 (3)	25		●	●	●	●	●	●	●	●
32 / (7)	8	24.9 - 31.9	25 (3)	30			●	●	●	●	●	●	●
38 / (8)	8	31.9 - 37.9	30 (4)	35			●	●	●	●	●	●	●

### Ordering-code (example):

2 2 6 2 . 4 G 3 . 1 4 0 0



**Format: Round**

P = Ø 14,0 mm

**Punch cutting length: L<sub>1</sub>**

25 mm

**Length: I**

100 mm

**Diameter: d<sub>2</sub>**

16 mm

**Type:**

light

**Version:**

Pilot pin with tapered tip

**Punch:**

without ejector pin

= 1400

**Order No**

= (3)

**Order code character**

= (G)

**Order No**

= (4)

**Order No**

= (2)

**Order No**

= (6)

= 22

### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

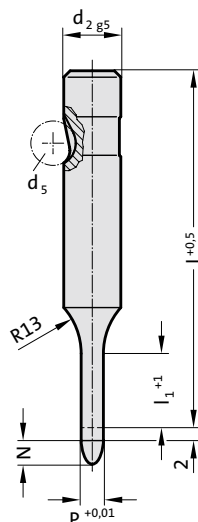
Shaft and pilot pin fine ground.

Special dimensions on request.

# Ball lock pilot pin, with parabolic tip, light duty



2272.



## 2272. Ball lock pilot pin, with parabolic tip, light duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	50 (A)	56 (B)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
6 / (1)	6	2,9-5,9	13 (1)		●	●	●	●	●	●	●
10 / (2)	8	5,9-9,9	19 (2)		●	●	●	●	●	●	●
13 / (3)	8	9,9-12,9	19 (2)		●	●	●	●	●	●	●
16 / (4)	8	12,9-15,9	25 (3)				●	●	●	●	●
20 / (5)	8	15,9-19,9	25 (3)				●	●	●	●	●
25 / (6)	8	19,9-24,9	25 (3)				●	●	●	●	●
32 / (7)	8	24,9-31,9	25 (3)					●	●	●	●
38 / (8)	8	31,9-37,9	30 (4)						●	●	●

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and pilot pin fine ground.  
Special dimensions on request.

### Note:

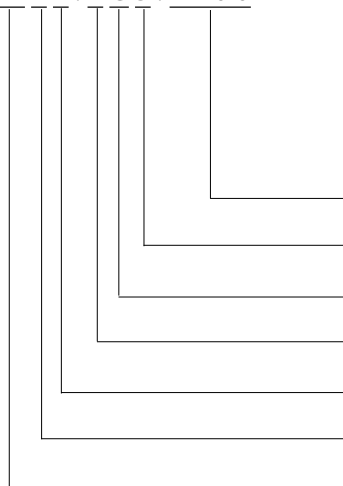
The 2 mm length provides full guidance before the blanking punch contacts the sheet metal.

### Length of parabolic tip N:

= 8 mm where P ≤ 10 mm  
= 12 mm where P 10,1 mm - 15 mm  
= 15 mm where P > 15 mm

### Ordering-code (example):

2 2 7 2 . 4 G 3 . 1 4 0 0



### Format: Round

P = Ø 14,0 mm

### Punch cutting length: l<sub>1</sub>

25 mm

### Length: l

100 mm

### Diameter: d<sub>2</sub>

16 mm

### Type:

light

### Version:

Pilot pin with parabolic tip

### Punch:

without ejector pin

= 1400

Order No

= (3)

Order code character

= (G)

Order No

= (4)

Order No

= (2)

Order No

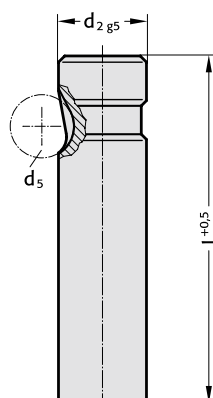
= (7)

= 22



## Ball lock punch, blank, heavy duty

2203.

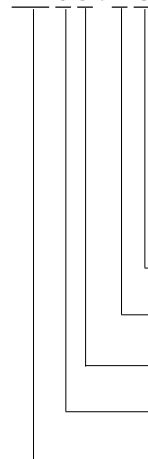


### 2203. Ball lock punch, blank, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)	140 (K)	150 (L)	175 (M)	200 (N)
10 / (2)	10		•	•	•	•	•	•	•	•	•	•	•
13 / (3)	12		•	•	•	•	•	•	•	•	•	•	•
16 / (4)	12		•	•	•	•	•	•	•	•	•	•	•
20 / (5)	12		•	•	•	•	•	•	•	•	•	•	•
25 / (6)	12		•	•	•	•	•	•	•	•	•	•	•
32 / (7)	12		•	•	•	•	•	•	•	•	•	•	•
40 / (9)	12		•	•	•	•	•	•	•	•	•	•	•

### Ordering code (example):

2 2 0 3 . 7 G



**Length: l**  
 100 mm  
**Diameter: d<sub>2</sub>**  
 32 mm  
**Type:**  
 heavy duty  
**Version:**  
 blank  
**Punch:**  
 without ejector pin

**Order Code character**  
 = (G)  
**Order No**  
 = (7)  
**Order No**  
 = (3)  
**Order No**  
 = (0)  
 = 22

### Material:

HSS  
 Hardness 62 ± 2 HRC

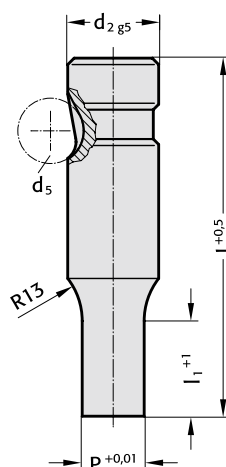
### Execution:

Shaft fine ground.  
 Special dimensions on request.

# Ball lock punch, stepped, round, heavy duty



2213.



## 2213. Ball lock punch, stepped, round, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6 - 9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	12	5 - 12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	8 - 15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	12 - 19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	16 - 24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	24 - 31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	30 - 39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Material:

HSS

Hardness 62 ± 2 HRC

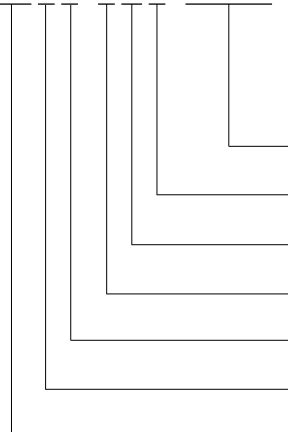
### Execution:

Shaft and punch diameter fine ground.

Special dimensions on request.

### Ordering-code (example):

2 2 1 3 . 7 G 2 . 2 4 5 0



#### Format: Round

P = ø24,5 mm

Punch cutting length: l<sub>1</sub>

19 mm

length: l

100 mm

diameter: d<sub>2</sub>

32 mm

Type:

heavy duty

Version:

Round

Punch:

without ejector pin

= 2450

Order No

= (2)

Order code character

= (G)

Order No

= (7)

Order No

= (3)

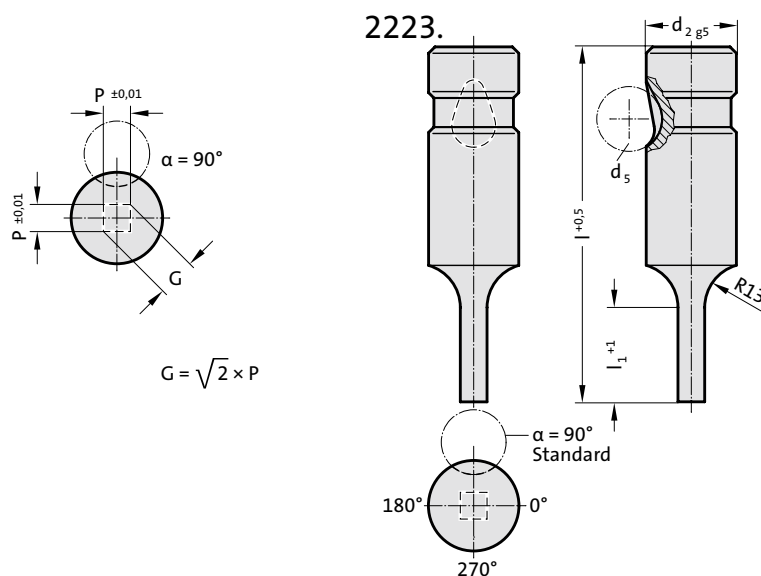
Order No

= (1)

= 22



## Ball lock punch, stepped, square, heavy duty



### 2223. Ball lock punch, stepped, square, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	12	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	10	24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	14	39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Ordering-code (example):

2 2 2 3 . 3 F 1 . 0 6 0 0 B

Angle:  
90°

Format: Square, length P

P = 6,0 mm

Punch cutting length: l<sub>1</sub>

13 mm

Length: l

90 mm

Diameter: d<sub>2</sub>

13 mm

Type:

heavy duty

Version:

Square

Punch:

without ejector pin

Order code character  
= (B)

= 0600

Order No

= (1)

Order code character

= (F)

Order No

= (3)

Order No

= (3)

Order No

= (2)

= 22

### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

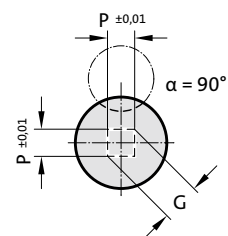
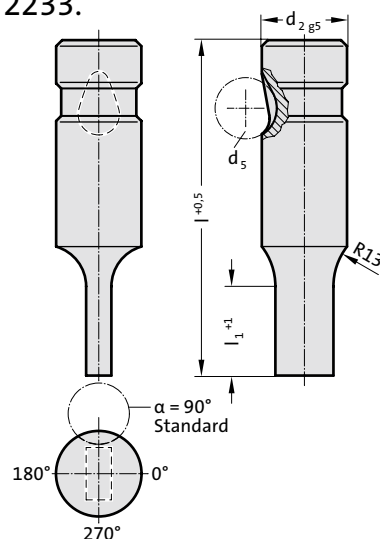
Shaft and punch shape fine ground.

Special dimensions on request.

# Ball lock punch, stepped, rectangular, heavy duty



2233.



$$G = \sqrt{2} \times P$$

## 2233. Ball lock punch, stepped, rectangular, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	12	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	10	24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	14	39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where W < 2.20

### Material:

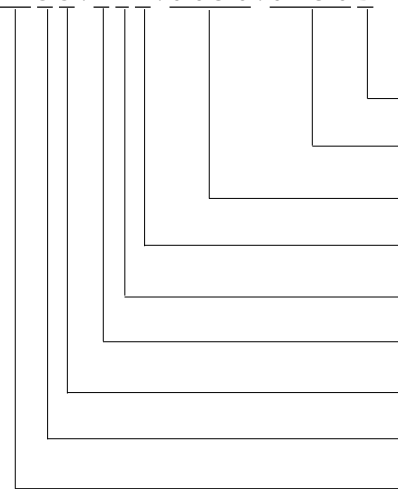
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

### Ordering-code (example):

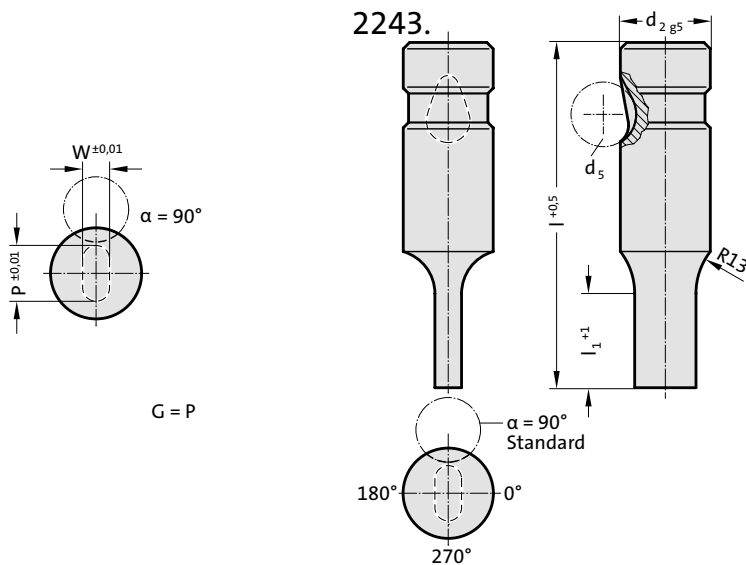
2233.2F1.0650.0450B



<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 4,5 mm	= 0450
<b>Format: Rectangular, length P</b> P = 6,5 mm	= 0650
<b>Punch cutting length: l<sub>1</sub></b> 13 mm	<b>Order No</b> = (1)
<b>Length: l</b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: d<sub>2</sub></b> 10 mm	<b>Order No</b> = (2)
<b>Type:</b> heavy duty	<b>Order No</b> = (3)
<b>Version:</b> Rectangular	<b>Order No</b> = (3)
<b>Punch:</b> without ejector pin	= 22



## Ball lock punch, stepped, slot, heavy duty



## 2243. Ball lock punch, stepped, slot, heavy duty

d <sub>2</sub> / (Order No)	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
32 / (7)	12.5	31.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
40 / (9)	14	39.9	19 (2) 25 (3) 30 (4)		●	●	●	●	●	●	●

\*l<sub>1</sub>=10 where W < 2.20

## Ordering-code (example):

2 2 4 3 . 3 E 2 . 1 2 1 5 . 0 9 1 5 B

Angle  
90°

Format: Slot, width W  
W = 9,15 mm

Format: Slot, length P  
P = 12,15 mm

Punch cutting length: l<sub>1</sub>  
19 mm

Length: l  
80 mm

Diameter: d<sub>2</sub>  
13 mm

Type:  
heavy duty

Version:  
Slot

Punch:  
without ejector pin

Order code character  
= (B)

= 0915

= 1215

Order No

= (2)

Order code character

= (E)

Order No

= (3)

Order No

= (3)

Order No

= (4)

= 22

## Material:

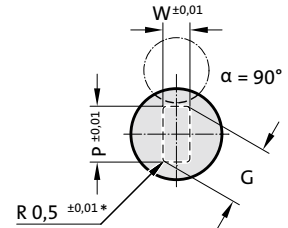
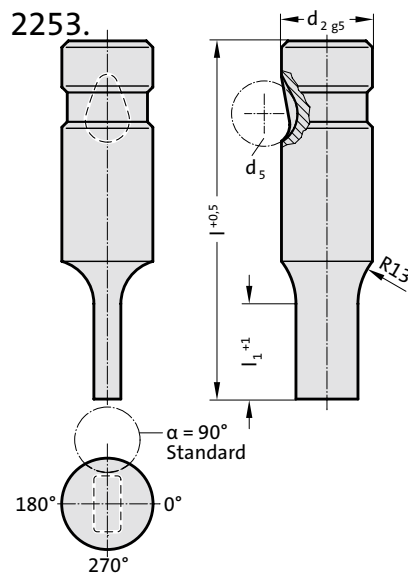
HSS  
Hardness 62 ± 2 HRC

## Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.



## Ball lock punch, stepped, rectangle with radiussed corners, heavy duty



$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2} + 1$$

### 2253. Ball lock punch, stepped, rectangle with radiussed corners, heavy duty

d <sub>2</sub> / (Order No)	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	10	24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	14	39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where W < 2.20

#### Material:

HSS  
Hardness 62 ± 2 HRC

#### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

\* For other radius options, see standardised special shapes.

#### Ordering-code (example):

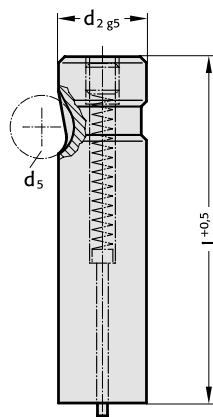
2253.2F1.0650.0450B

2	2	5	3	.	2	F	1	.	0	6	5	0	.	0	4	5	0	B
Punch:	without ejector pin																	= 22
Version:	Rectangle with radiussed corners																	= (5)
Type:	heavy duty																	= (3)
Diameter: d <sub>2</sub>	10 mm																	= (2)
Length: l	90 mm																	= (F)
Punch cutting length: l <sub>1</sub>	13 mm																	= (1)
Format: Rectangle with radiussed corners, length P	P = 6,5 mm																	= 0650
Format: Rectangle with radiussed corners, width W	W = 4,5 mm																	= 0450
Angle:	90°																	= (B)



## Ball lock punch, blank, with ejector pin, heavy duty

2703.

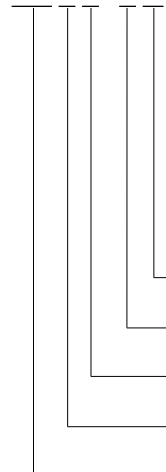


### 2703. Ball lock punch, blank, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10		●	●	●	●	●	●	●
13 / (3)	12		●	●	●	●	●	●	●
16 / (4)	12		●	●	●	●	●	●	●
20 / (5)	12		●	●	●	●	●	●	●
25 / (6)	12		●	●	●	●	●	●	●
32 / (7)	12		●	●	●	●	●	●	●
40 / (9)	12		●	●	●	●	●	●	●

### Ordering-code (example):

2 7 0 3 . 7 G



**Length: l**  
100 mm  
**Diameter: d<sub>2</sub>**  
32 mm  
**Type:**  
heavy duty  
**Version:**  
blank  
**Punch:**  
with ejector pin

**Order code character**  
= (G)  
**Order No**  
= (7)  
**Order No**  
= (3)  
**Order No**  
= (0)  
= 27

### Material:

HSS  
Hardness 62 ± 2 HRC

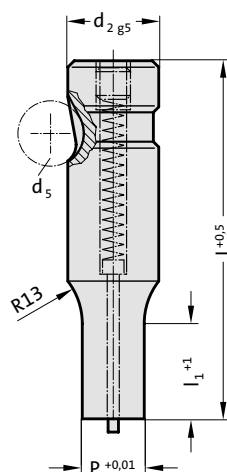
### Execution:

Shaft fine ground.  
Special dimensions on request.

# Ball lock punch, stepped, round, with ejector pin, heavy duty



2713.



## 2713. Ball lock punch, stepped, round, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6 - 9.9	13 (1) 19 (2)		●	●	●	●	●		
13 / (3)	12	5 - 12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	8 - 15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	12 - 19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	16 - 24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	24 - 31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	30 - 39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Material:

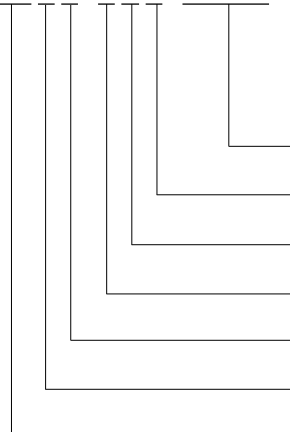
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch diameter fine ground.  
Special dimensions on request.

### Ordering-code (example):

2 7 1 3 . 3 C 1 . 0 5 5 0



#### Format: Round

P = Ø 5,5 mm

Punch cutting length: l<sub>1</sub>

13 mm

length: l

63 mm

diameter: d<sub>2</sub>

13 mm

Type:

heavy duty

Version:

Round

Punch:

with ejector pin

= 0550

Order No

= (1)

Order code character

= (C)

Order No

= (3)

Order No

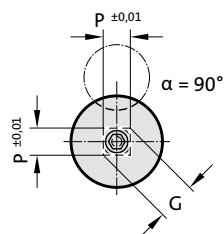
= (3)

Order No

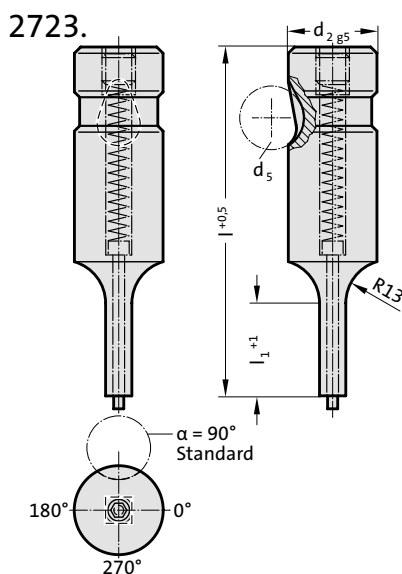
= (1)

= 27

# Ball lock punch, stepped, square, with ejector pin, heavy duty



$$G = \sqrt{2} \times P$$



## 2723. Ball lock punch, stepped, square, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	12	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	10	24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	14	39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where P < 2.20

### Ordering-code (example):

2723.2F1.0650B

Angle:  
90°

Format: Square, length P  
P = 6,5 mm  
Punch cutting length: l<sub>1</sub>  
13 mm  
Length: l  
90 mm  
Diameter: d<sub>2</sub>  
10 mm  
Type:  
heavy duty  
Version:  
Square  
Punch:  
with ejector pin

Order code character  
= (B)

= 0650  
Order No  
= (1)  
Order code character  
= (F)  
Order No  
= (2)  
Order No  
= (3)  
Order No  
= (2)  
= 27

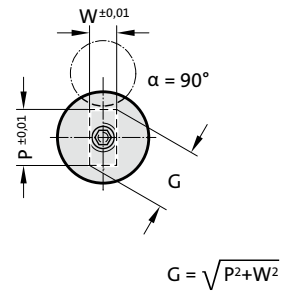
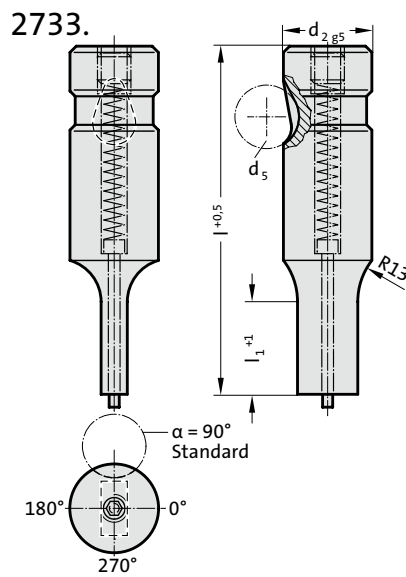
### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

# Ball lock punch, stepped, rectangular, with ejector pin, heavy duty



## 2733. Ball lock punch, stepped, rectangular, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	12	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	10	24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	14	39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\*l<sub>1</sub>=10 where W < 2.20

### Material:

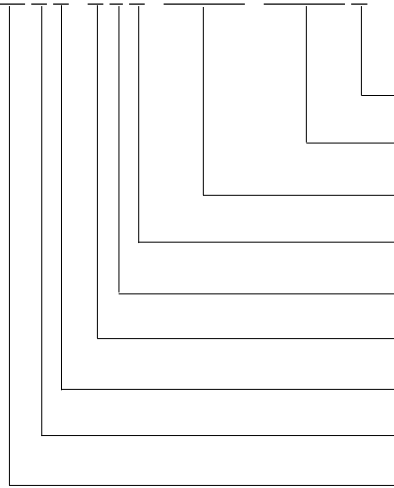
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

### Ordering-code (example):

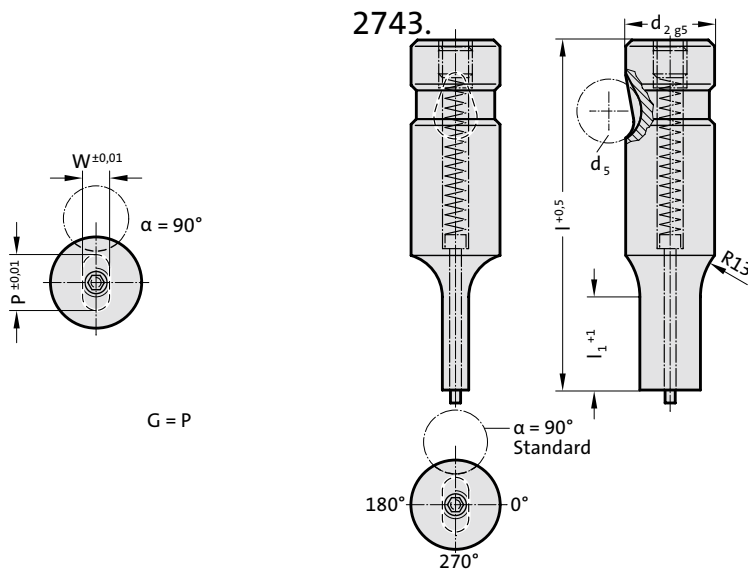
2733.7F2.1400.1250B



<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 12,5 mm	<b>Order code character</b> = 1250
<b>Format: Rectangular, length P</b> P = 14,0 mm	<b>Order code character</b> = 1400
<b>Punch cutting length: l<sub>1</sub></b> 19 mm	<b>Order No</b> = (2)
<b>Length: l</b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: d<sub>2</sub></b> 32 mm	<b>Order No</b> = (7)
<b>Type:</b> heavy duty	<b>Order No</b> = (3)
<b>Version:</b> Rectangular	<b>Order No</b> = (3)
<b>Punch:</b> with ejector pin	<b>Order No</b> = 27



## Ball lock punch, stepped, slot, with ejector pin, heavy duty



### 2743. Ball lock punch, stepped, slot, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)*	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (I)
10 / (2)	10	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●	●	●
13 / (3)	12	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	10	24.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
32 / (7)	12	12.5	31.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
40 / (9)	12	14	39.9	19 (2) 25 (3) 30 (4)		●	●	●	●	●	●	●

\*l<sub>1</sub>=10 where W < 2.20

### Ordering-code (example):

2 7 4 3 . 2 F 1 . 0 6 5 0 . 0 4 5 0 B

Angle  
90°  
Format: Slot, width W  
W = 4,5 mm  
Format: Slot, length P  
P = 6,5 mm  
Punch cutting length: l<sub>1</sub>  
13 mm  
Length: l  
90 mm  
Diameter: d<sub>2</sub>  
10 mm  
Type:  
heavy duty  
Version:  
Slot  
Punch:  
with ejector pin

Order code character  
= (B)

= 0450

= 0650

Order No

= (1)

Order code character

= (F)

Order No

= (2)

Order No

= (3)

Order No

= (4)

= 27

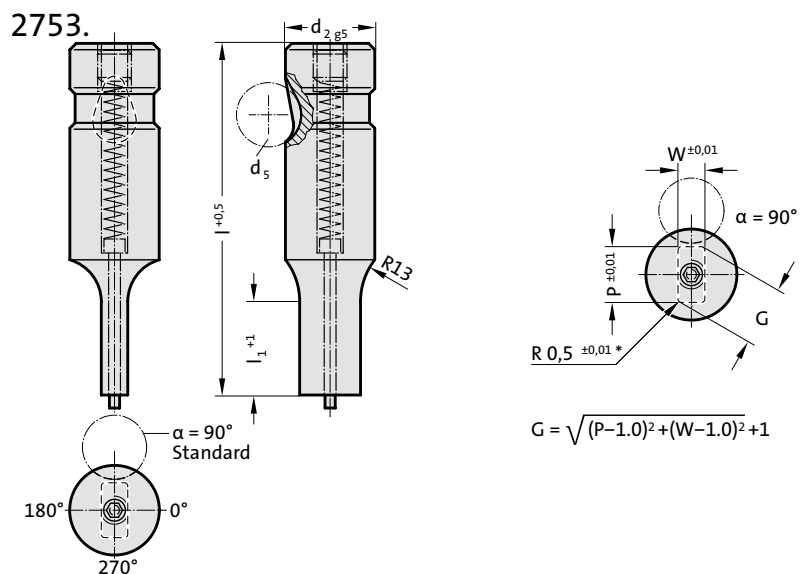
### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.



2753. Ball lock punch, stepped, rectangle with radiussed corners, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	I <sub>1</sub> / (Order No)*	I / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)
10 / (2)	10	1.6	9.9	13 (1) 19 (2)		●	●	●	●	●		
13 / (3)	12	4.5	12.9	13 (1) 19 (2)		●	●	●	●	●	●	●
16 / (4)	12	6	15.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
20 / (5)	12	8	19.9	13 (1) 19 (2) 25 (3)		●	●	●	●	●	●	●
25 / (6)	12	10	24.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
32 / (7)	12	12.5	31.9	13 (1) 19 (2) 25 (3)			●	●	●	●	●	●
40 / (9)	12	14	39.9	19 (2) 25 (3) 30 (4)				●	●	●	●	●

\* $I_1=10$  where  $W < 2.20$

Material:

HSS  
Hardness  $62 \pm 2$  HRC

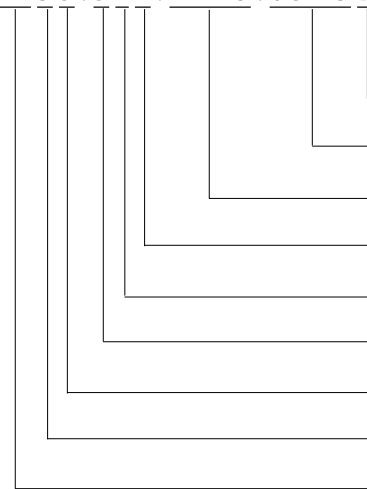
Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

\* For other radius options, see standardised special shapes.

Ordering-code (example):

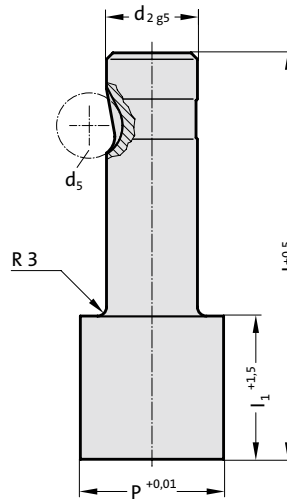
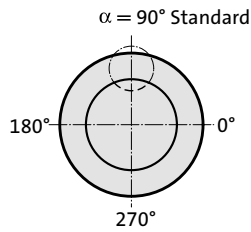
2753.3F1.1215.0915B



<b>Angle:</b>	<b>Order code character</b>
90°	= (B)
<b>Format: Rectangle with radiused corners, width W</b>	
W = 9,15 mm	= 0915
<b>Format: Rectangle with radiused corners, length P</b>	
P = 12,15 mm	= 1215
<b>Punch cutting length: l<sub>1</sub></b>	<b>Order No</b>
13 mm	= (1)
<b>Length: l</b>	<b>Order code character</b>
90 mm	= (F)
<b>Diameter: d<sub>2</sub></b>	<b>Order No</b>
13 mm	= (3)
<b>Type:</b>	<b>Order No</b>
heavy duty	= (3)
<b>Version:</b>	<b>Order No</b>
Rectangle with radiused corners	= (5)
<b>Punch:</b>	
with ejector pin	= 27

## Ball lock punch, punch larger than shaft, blank, heavy duty

2205.

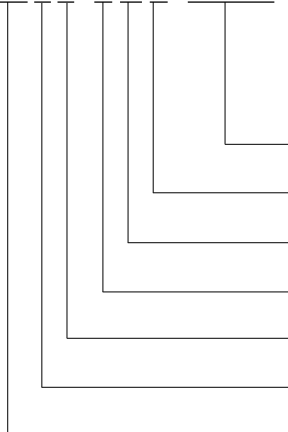


### 2205. Ball lock punch, punch larger than shaft, blank, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	56	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2 2 0 5 . 7 G 4 . 5 0 0 0



**Format: Round**  
P = Ø 50,0 mm  
**Punch cutting length: l<sub>1</sub>**  
30 mm  
**length: l**  
100 mm  
**diameter: d<sub>2</sub>**  
32 mm  
**Type:**  
punch larger, heavy duty  
**Version:**  
Blank  
**Punch:**  
without ejector pin

= 5000  
**Order No**  
= (4)  
**Order code character**  
= (G)  
**Order No**  
= (7)  
**Order No**  
= (5)  
**Order No**  
= (0)  
= 22

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

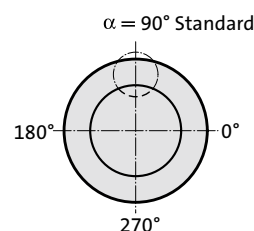
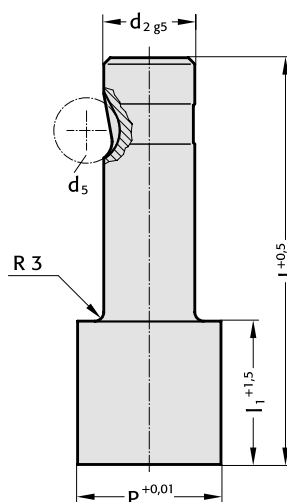
Shaft and punch diameter fine ground.  
Special dimensions on request.



# Ball lock punch, punch larger than shaft, round, heavy duty



2215.



## 2215. Ball lock punch, punch larger than shaft, round, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	13 - 32	19 (2) 30 (4)		●	●	●
16 / (4)	12	16 - 38	19 (2) 30 (4)		●	●	●
20 / (5)	12	20 - 40	19 (2) 30 (4)		●	●	●
25 / (6)	12	25 - 44	19 (2) 30 (4)		●	●	●
32 / (7)	12	32 - 50	19 (2) 30 (4)		●	●	●
40 / (9)	12	40 - 56	19 (2) 30 (4)		●	●	●

### Material:

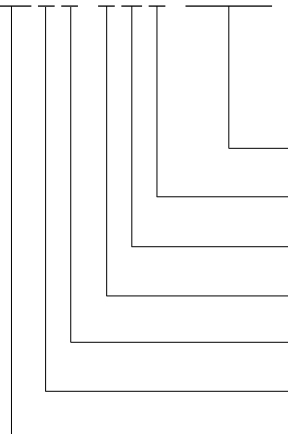
HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch diameter fine ground.  
Special dimensions on request.

### Ordering-code (example):

2 2 1 5 . 7 G 2 . 3 2 1 0



#### Format: Round

P = Ø 32,1 mm

Punch cutting length: l<sub>1</sub>

19 mm

length: l

100 mm

diameter: d<sub>2</sub>

32 mm

Type:

punch larger, heavy duty

Version:

Round

Punch:

without ejector pin

= 3210

Order No

= (2)

Order code character

= (G)

Order No

= (7)

Order No

= (5)

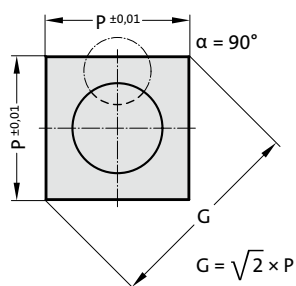
Order No

= (1)

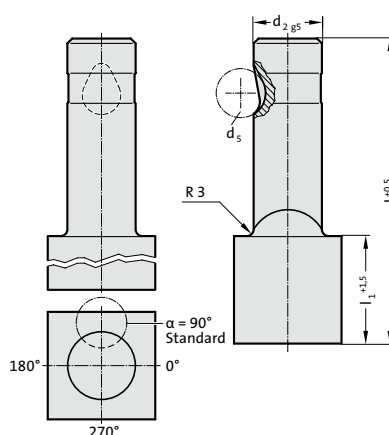
= 22



# Ball lock punch, punch larger than shaft, square, heavy duty



2225.



## 2225. Ball lock punch, punch larger than shaft, square, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	I / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	9.19	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	11.31	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	14.14	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	17.68	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	22.63	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	28.28	56	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2 2 2 5 . 4 F 4 . 1 1 5 0 B

Angle:  
90°

Format: Square, length P  
P = 11,5 mm

Punch cutting length: l<sub>1</sub>  
30 mm

Length: I  
90 mm

Diameter: d<sub>2</sub>  
16 mm

Type:  
punch larger, heavy duty

Version:  
Square

Punch:  
without ejector pin

Order code character  
= (B)

= 1150

Order No  
= (4)

Order code character  
= (F)

Order No  
= (4)

Order No  
= (5)

Order No  
= (2)

= 22

### Material:

HSS  
Hardness 62 ± 2 HRC

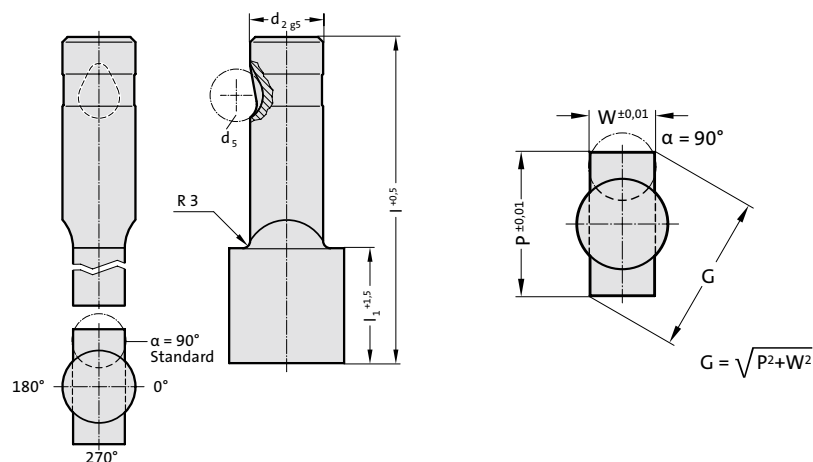
### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

# Ball lock punch, punch larger than shaft, rectangular, heavy duty



2235.



## 2235. Ball lock punch, punch larger than shaft, rectangular, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	11.5	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	14	56	19 (2) 30 (4)		●	●	●

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

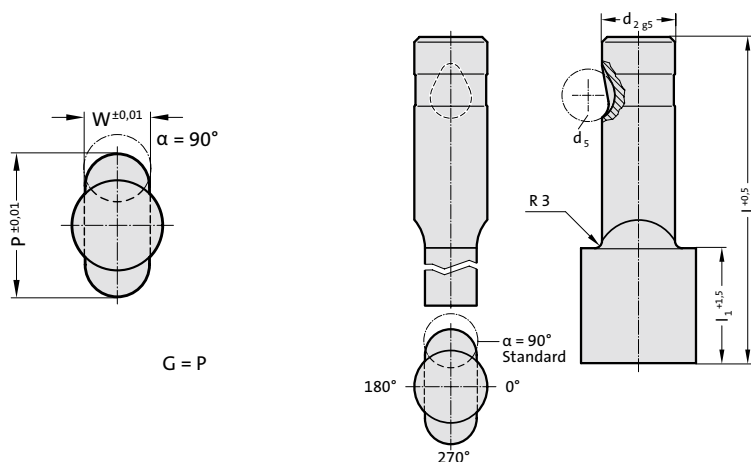
### Ordering-code (example):

2 2 3 5 . 4 F 4 . 1 4 0 0 . 1 1 0 0 B

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

## Ball lock punch, punch larger than shaft, slot, heavy duty

2245.



### 2245. Ball lock punch, punch larger than shaft, slot, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	11.5	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	14	56	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2 2 4 5 . 7 F 2 . 3 8 0 0 . 1 1 5 0 B

Angle  
 90°  
 Format: Slot, width W  
 W = 11,5 mm  
 Format: Slot, length P  
 P = 38,0 mm  
 Punch cutting length: l<sub>1</sub>  
 19 mm  
 Length: l  
 90 mm  
 Diameter: d<sub>2</sub>  
 32 mm  
 Type:  
 punch larger, heavy duty  
 Version:  
 Slot  
 Punch:  
 without ejector pin

Order code character  
= (B)

= 1150

= 3800

Order No

= (2)

Order code character

= (F)

Order No

= (7)

Order No

= (5)

Order No

= (4)

= 22

### Material:

HSS  
Hardness 62 ± 2 HRC

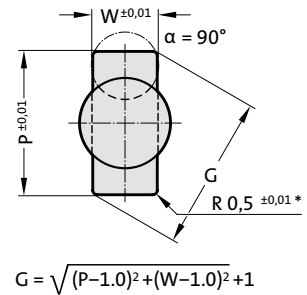
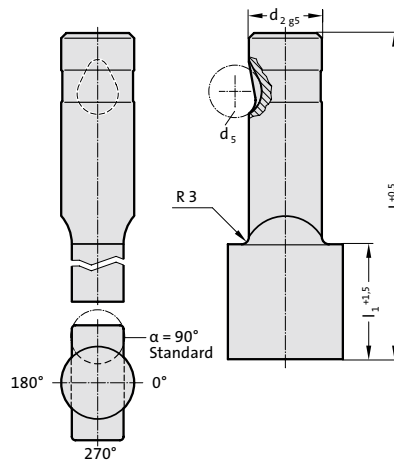
### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

Ball lock punch, punch larger than shaft, rectangle with radiussed corners, heavy duty



2255.



$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2 + 1}$$

2255. Ball lock punch, punch larger than shaft, rectangle with radiussed corners, heavy duty

$d_2$ / (Order No)	$d_5$	$W_{\min}$	$G_{\max}$	$l_1$ / (Order No)	$l$ / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	11.5	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	14	56	19 (2) 30 (4)		●	●	●

**Material:**

HSS  
Hardness  $62 \pm 2$  HRC

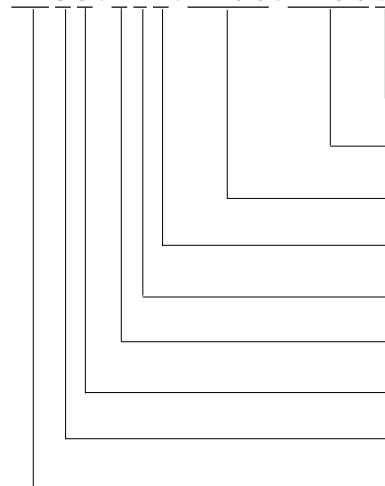
Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

\* For other radius options, see standardised special shapes.

Ordering-code (example):

2255.4F2.1400.1100B

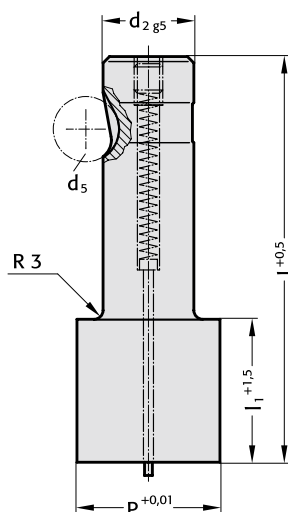
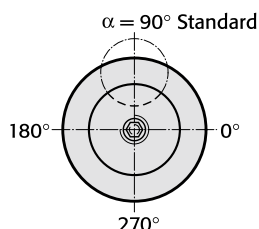


<b>Angle:</b>	<b>Order code character</b>
90°	= (B)
<b>Format: Rectangle with radiused corners, width W</b>	
W = 11,0 mm	= 1100
<b>Format: Rectangle with radiused corners, length P</b>	
P = 14,0 mm	= 1400
<b>Punch cutting length: l<sub>1</sub></b>	<b>Order No</b>
19 mm	= (2)
<b>Length: l</b>	<b>Order code character</b>
90 mm	= (F)
<b>Diameter: d<sub>2</sub></b>	<b>Order No</b>
16 mm	= (4)
<b>Type:</b>	<b>Order No</b>
punch larger, heavy duty	= (5)
<b>Version:</b>	<b>Order No</b>
Rectangle with radiused corners	= (5)
<b>Punch:</b>	
without ejector pin	= 22

# Ball lock punch, punch larger than shaft, blank, with ejector pin, heavy duty



2705.

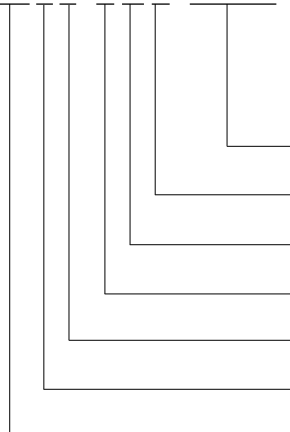


## 2705. Ball lock punch, punch larger than shaft, blank, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	32	19 (2) 30 (4)		●	●	●
16 / (4)	38	19 (2) 30 (4)		●	●	●
20 / (5)	40	19 (2) 30 (4)		●	●	●
25 / (6)	44	19 (2) 30 (4)		●	●	●
32 / (7)	50	19 (2) 30 (4)		●	●	●
40 / (9)	56	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2705.7G4.5000



#### Format: Round

P = Ø 50,0 mm

Punch cutting length: l<sub>1</sub>

30 mm

length: l

100 mm

diameter: d<sub>2</sub>

32 mm

Type:

punch larger, heavy duty

Version:

Blank

Punch:

with ejector pin

= 5000

Order No

= (4)

Order code character

= (G)

Order No

= (7)

Order No

= (5)

Order No

= (0)

= 27

### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

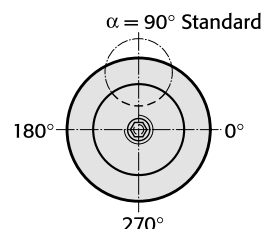
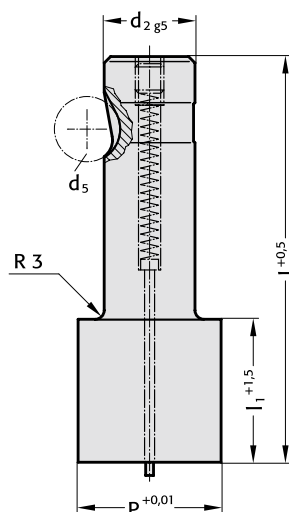
Shaft and punch diameter fine ground.

Special dimensions on request.

## Ball lock punch, punch larger than shaft, round, with ejector pin, heavy duty



2715.



### 2715. Ball lock punch, punch larger than shaft, round, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	13 - 32	19 (2) 30 (4)		●	●	●
16 / (4)	12	16 - 38	19 (2) 30 (4)		●	●	●
20 / (5)	12	20 - 40	19 (2) 30 (4)		●	●	●
25 / (6)	12	25 - 44	19 (2) 30 (4)		●	●	●
32 / (7)	12	32 - 50	19 (2) 30 (4)		●	●	●
40 / (9)	12	40 - 56	19 (2) 30 (4)		●	●	●

#### Material:

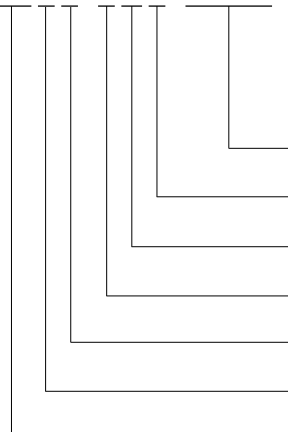
HSS  
Hardness 62 ± 2 HRC

#### Execution:

Shaft and punch diameter fine ground.  
Special dimensions on request.

#### Ordering-code (example):

2 7 1 5 . 7 G 2 . 3 2 1 0



#### Format: Round

P = Ø 32,1 mm

Punch cutting length: l<sub>1</sub>

19 mm

length: l

100 mm

diameter: d<sub>2</sub>

32 mm

Type:

punch larger, heavy duty

Version:

Round

Punch:

with ejector pin

= 3210

Order No

= (2)

Order code character

= (G)

Order No

= (7)

Order No

= (5)

Order No

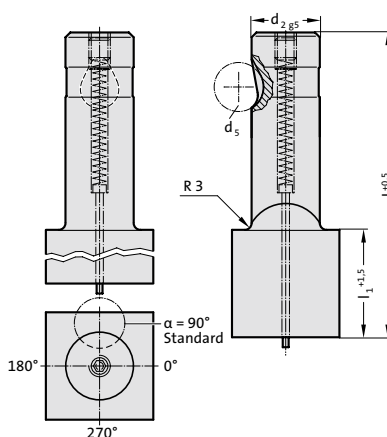
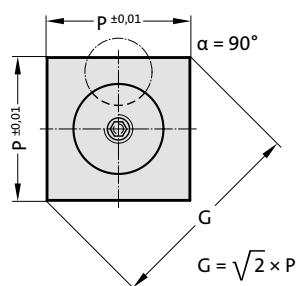
= (1)

= 27

# Ball lock punch, punch larger than shaft, square, with ejector pin, heavy duty



2725.



## 2725. Ball lock punch, punch larger than shaft, square, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	9.19	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	11.31	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	14.14	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	17.68	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	22.63	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	28.28	56	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2725.4F4.2500B

Angle:  
90°

Format: Square, length P  
P = 25,0 mm

Punch cutting length: l<sub>1</sub>  
30 mm

Length: l  
90 mm

Diameter: d<sub>2</sub>  
16 mm

Type:  
punch larger, heavy duty

Version:

Square

Punch:

with ejector pin

Order code character  
= (B)

= 2500

Order No  
= (4)

Order code character  
= (F)

Order No  
= (4)

Order No  
= (5)

Order No  
= (2)

= 27

### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

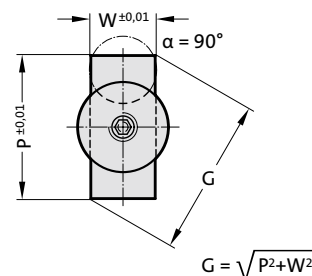
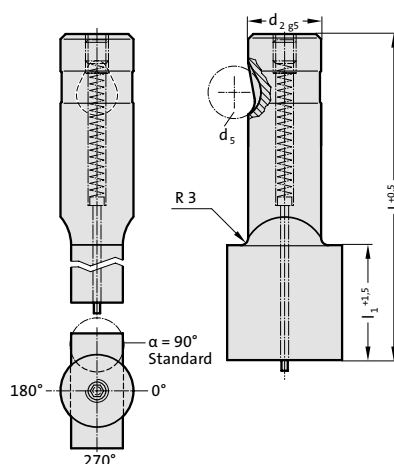
Shaft and punch shape fine ground.  
Special dimensions on request.



## Ball lock punch, punch larger than shaft, rectangular, with ejector pin, heavy duty



2735.



### 2735. Ball lock punch, punch larger than shaft, rectangular, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	11.5	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	14	56	19 (2) 30 (4)		●	●	●

#### Material:

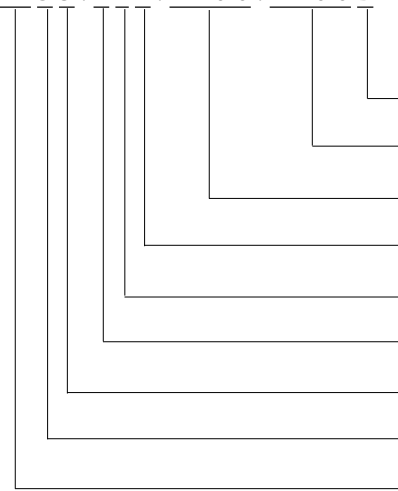
HSS  
Hardness 62 ± 2 HRC

#### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.

#### Ordering-code (example):

2735.4F4.1400.1100B

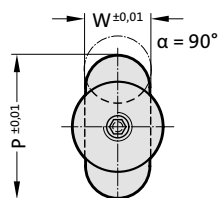


<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 11,0 mm	= 1100
<b>Format: Rectangular, length P</b> P = 14,0 mm	= 1400
<b>Punch cutting length: l<sub>1</sub></b> 30 mm	<b>Order No</b> = (4)
<b>Length: l</b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: d<sub>2</sub></b> 16 mm	<b>Order No</b> = (4)
<b>Type:</b> punch larger, heavy duty	<b>Order No</b> = (5)
<b>Version:</b> Rectangular	<b>Order No</b> = (3)
<b>Punch:</b> with ejector pin	= 27

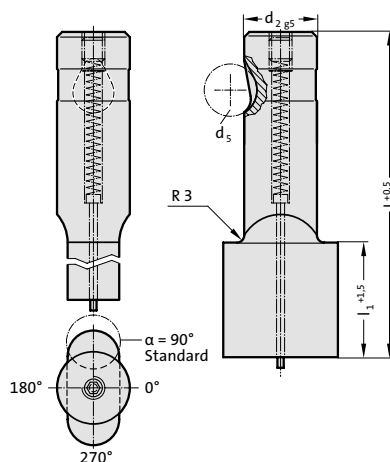
# Ball lock punch, punch larger than shaft, slot, with ejector pin, heavy duty



2745.



G = P



## 2745. Ball lock punch, punch larger than shaft, slot, with ejector pin, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	l / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	11.5	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	14	56	19 (2) 30 (4)		●	●	●

### Ordering-code (example):

2745.4F4.1400.1100B

Angle  
90°  
Format: Slot, width W  
W = 11,0 mm  
Format: Slot, length P  
P = 14,0 mm  
Punch cutting length: l<sub>1</sub>  
30 mm  
Length: l  
90 mm  
Diameter: d<sub>2</sub>  
16 mm  
Type:  
punch larger, heavy duty  
Version:  
Slot  
Punch:  
with ejector pin

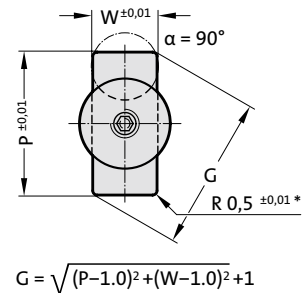
Order code character  
= (B)  
= 1100  
= 1400  
Order No  
= (4)  
Order code character  
= (F)  
Order No  
= (4)  
Order No  
= (5)  
Order No  
= (4)  
= 27

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and punch shape fine ground.  
Special dimensions on request.



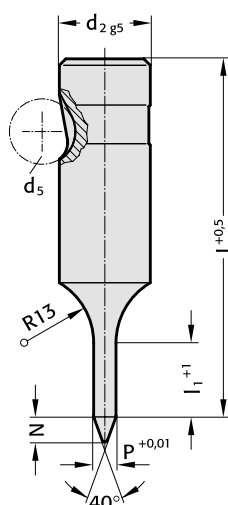
$d_2$ / (Order No)	$d_5$	$W_{min}$	$G_{max}$	$l_1$ / (Order No)	$l$ / (Order Code character)	80 (E)	90 (F)	100 (G)
13 / (3)	12	5	32	19 (2) 30 (4)		●	●	●
16 / (4)	12	6.5	38	19 (2) 30 (4)		●	●	●
20 / (5)	12	8	40	19 (2) 30 (4)		●	●	●
25 / (6)	12	10	44	19 (2) 30 (4)		●	●	●
32 / (7)	12	11.5	50	19 (2) 30 (4)		●	●	●
40 / (9)	12	14	56	19 (2) 30 (4)		●	●	●

<b>Angle:</b>	<b>Order code character</b>
90°	= (B)
<b>Format: Rectangle with radiused corners, width W</b>	
W = 11,0 mm	= 1100
<b>Format: Rectangle with radiused corners, length P</b>	
P = 12,15 mm	= 1215
<b>Punch cutting length: l<sub>1</sub></b>	<b>Order No</b>
19 mm	= (2)
<b>Length: l</b>	<b>Order code character</b>
90 mm	= (F)
<b>Diameter: d<sub>2</sub></b>	<b>Order No</b>
13 mm	= (3)
<b>Type:</b>	<b>Order No</b>
punch larger, heavy duty	= (5)
<b>Version:</b>	<b>Order No</b>
Rectangle with radiused corners	= (5)
<b>Punch:</b>	
with ejector pin	= 27



## Ball lock pilot pin, with tapered tip, heavy duty

2263.

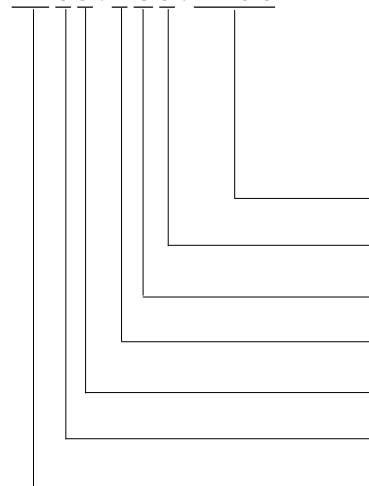


### 2263. Ball lock pilot pin, with tapered tip, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	N	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (J)	140 (K)	150 (L)
10 / (2)	10	5,9-9,9	19 (2)	8		●	●	●	●	●			
13 / (3)	12	9,9-12,9	19 (2)	10		●	●	●	●	●	●	●	
16 / (4)	12	12,9-15,9	25 (3)	15		●	●	●	●	●	●	●	●
20 / (5)	12	15,9-19,9	25 (3)	20		●	●	●	●	●	●	●	●
25 / (6)	12	19,9-24,9	25 (3)	25			●	●	●	●	●	●	●
32 / (7)	12	24,9-31,9	25 (3)	30			●	●	●	●	●	●	●
40 / (9)	12	31,9-39,9	30 (4)	40			●	●	●	●	●	●	●

### Ordering-code (example):

2 2 6 3 . 4 G 3 . 1 4 0 0



**Format: Round**

P = Ø 14,0 mm

**Punch cutting length: l<sub>1</sub>**

25 mm

**Length: l**

100 mm

**Diameter: d<sub>2</sub>**

16 mm

**Type:**

heavy

**Version:**

Pilot pin with tapered tip

**Punch:**

without ejector pin

= 1400

**Order No**

= (3)

**Order code character**

= (G)

**Order No**

= (4)

**Order No**

= (3)

**Order No**

= (6)

= 22

### Material:

HSS

Hardness 62 ± 2 HRC

### Execution:

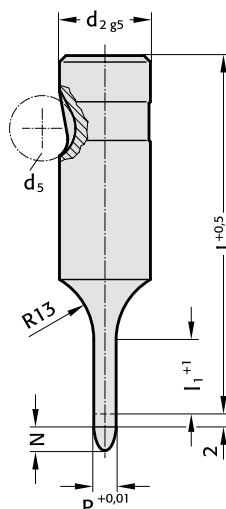
Shaft and pilot pin fine ground.

Special dimensions on request.

# Ball lock pilot pin, with parabolic tip, heavy duty



2273.



## 2273. Ball lock pilot pin, with parabolic tip, heavy duty

d <sub>2</sub> / (Order No)	d <sub>5</sub>	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (I)
10 / (2)	10	5,9-9,9	19 (2)		●	●	●	●	●	●	●
13 / (3)	12	9,9-12,9	19 (2)		●	●	●	●	●	●	●
16 / (4)	12	12,9-15,9	25 (3)		●	●	●	●	●	●	●
20 / (5)	12	15,9-19,9	25 (3)		●	●	●	●	●	●	●
25 / (6)	12	19,9-24,9	25 (3)		●	●	●	●	●	●	●
32 / (7)	12	24,9-31,9	25 (3)			●	●	●	●	●	●
40 / (9)	12	31,9-39,9	30 (4)				●	●	●	●	●

### Material:

HSS  
Hardness 62 ± 2 HRC

### Execution:

Shaft and pilot pin fine ground.  
Special dimensions on request.

### Note:

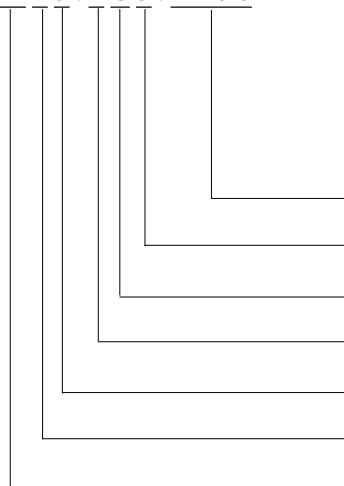
The 2 mm length provides full guidance  
before the blanking punch contacts the sheet  
metal.

### Length of parabolic tip N:

= 8 mm where P ≤ 10 mm  
= 12 mm where P 10,1 mm - 15 mm  
= 15 mm where P > 15 mm

### Ordering-code (example):

2 2 7 3 . 4 G 3 . 1 4 0 0



#### Format: Round

P = Ø 14,0 mm

#### Punch cutting length: l<sub>1</sub>

25 mm

#### Length: l

100 mm

#### Diameter: d<sub>2</sub>

16 mm

#### Type:

heavy

#### Version:

Pilot pin with parabolic tip

#### Punch:

without ejector pin

= 1400

Order No

= (3)

Order code character

= (G)

Order No

= (4)

Order No

= (3)

Order No

= (7)

= 22

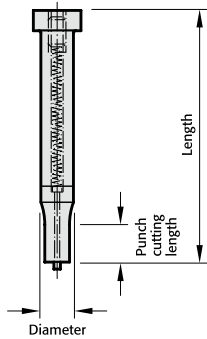


## **Punches ISO 8020**



## Ordering example Punches ISO 8020

**Note:** See table for standard dimensions  
Special dimensions to order



Punch:  
22 without ejector pin  
27 with ejector pin

**Version:**

Version	Order No
blank	= 0
round	= 1
square	= 2
rectangular	= 3
slot	= 4
rectangle with radiused corners	= 5
pilot pin with tapered tip	= 6
pilot pin parabolic tip	= 7
special shapes	= 9

**Type:**

Type	Order No
ISO	= 1

**Punch cutting length:  $l_1$**

Punch cutting length: $l_1$	Order No
8	= 1
10	= 2
13	= 3
19	= 4
25	= 5
30	= 6
special	= X

**Diameter:  $d_1$**

Diameter: $d_1$	Order No
3	= 1
4	= 2
5	= 3
6	= 4
8	= 5
10	= 6
13	= 7
16	= 8
20	= 9
25	= 10
32	= 11

**Length:  $l$**

Length: $l$	Order Code character
50	= A
56	= B
63	= C
71	= D
80	= E
90	= F
100	= G
110	= H
120	= J
125	= K
140	= L
150	= M
200	= N
special	= X

**Format: Slot length  $P = 6,5$  mm**

**Format: Slot width  $W = 4,5$  mm**

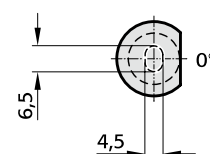
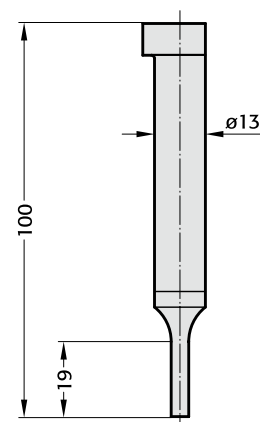
**Angle:**

Angle	Order Code character
0°	= A
90°	= B
180°	= C
270°	= D
special	= X

### Ordering Code (Example):

2 2 4 1 . 7 G 4 . 0 6 5 0 . 0 4 5 0 A

- Angle = 0° (A)
- Format: Slot, width  $W = 4,5$  mm (0450)
- Format: Slot, length  $P = 6,5$  mm (0650)
- Punch cutting length:  $l_1 = 19$  mm (4)
- Length:  $l = 100$  mm (G)
- Diameter:  $d_1 = 13$  mm (7)
- Type = ISO (1)
- Version: Slot (4)
- Punch: without ejector pin (22)

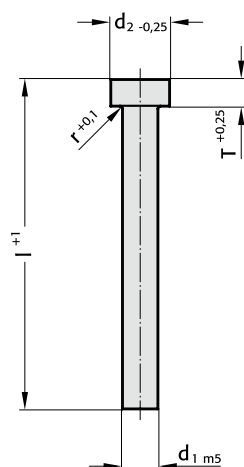


# Punch, blank, ISO 8020



FIBRO

2201.



2201. Punch, blank, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)	150 (M)	200 (N)
3 / (1)	5	0.25	3		●	●	●	●	●		
4 / (2)	6	0.25	3		●	●	●	●	●		
5 / (3)	8	0.3	5		●	●	●	●	●		
6 / (4)	9	0.3	5		●	●	●	●	●		
8 / (5)	11	0.3	5		●	●	●	●	●		
10 / (6)	13	0.3	5		●	●	●	●	●	●	
13 / (7)	16	0.4	5		●	●	●	●	●	●	
16 / (8)	19	0.4	5		●	●	●	●	●	●	●
20 / (9)	23	0.4	5		●	●	●	●	●	●	●
25 / (10)	28	0.4	5		●	●	●	●	●	●	●
32 / (11)	35	0.4	5		●	●	●	●	●	●	●

Ordering code (example):

2201.7G.ASP

complete for material ASP

Length: l

Diameter: d<sub>1</sub>

13 mm

Type:

ISO

Version:

blank

Punch:

without ejector pin

Order Code character

= (G)

Order No

= (7)

Order No

= (1)

Order No

= (0)

= 22

Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

ASP 23 - ASP 2023

upon request

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

Execution:

Punch head hot upset-forged. Shoulder and shaft fine ground.

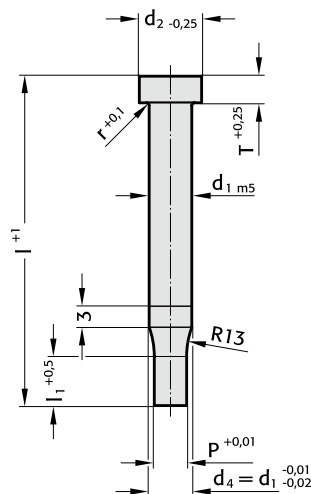
Special dimensions on request.



# Punch, stepped, round, ISO 8020



2211.



## 2211. Punch, stepped, round, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	P	l <sub>1</sub> / (Order No)	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
3 / (1)	5	0,8-2,9	8 (1) 10 (2)	0.25	3		●	●	●	●	●
4 / (2)	6	1,0-3,9	8 (1) 13 (3)	0.25	3		●	●	●	●	●
5 / (3)	8	1,5-4,9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	1,6-5,9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2,5-7,9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	4,0-9,9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	5,0-12,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	8,0-15,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	12,0-19,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	16,5-24,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	20,0-31,9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

ASP 23 - ASP 2023

upon request

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

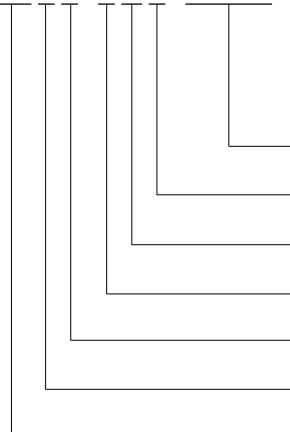
### Execution:

Punch head hot upset-forged. Shoulder, shaft and punch diameter fine ground.

Special dimensions on request.

### Ordering-code (example):

2 2 1 1 . 7 G 4 . 0 7 0 0



**Format: Round**

P = Ø 7,0 mm

**Punch cutting length: l<sub>1</sub>**

19 mm

**Length: l**

100 mm

**Diameter: d<sub>1</sub>**

13 mm

**Type:**

ISO

**Version:**

Round

**Punch:**

without ejector pin

= 0700

**Order No**

= (4)

**Order code character**

= (G)

**Order No**

= (7)

**Order No**

= (1)

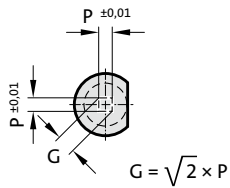
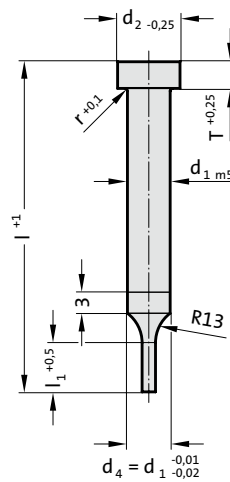
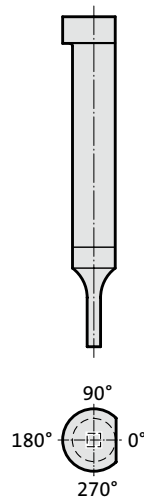
**Order No**

= (1)

= 22



## Punch, stepped, square, ISO 8020

**2221.**

### 2221. Punch, stepped, square, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	P <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
3 / (1)	5	0.5	2.9	8 (1) 10 (2)	0.25	3		●	●	●	●	●
4 / (2)	6	0.8	3.9	8 (1) 13 (3)	0.25	3		●	●	●	●	●
5 / (3)	8	1	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	1.6	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	3.5	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	4.5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	6	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	8	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	10	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	10	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Ordering-code (example):

**2 2 2 1 . 1 0 E 5 . 1 5 0 0 B****Angle:**  
90°**Format:** Square, length P  
P = 15,0 mm  
**Punch cutting length:** l<sub>1</sub>  
25 mm  
**Length:** l  
80 mm  
**Diameter:** d<sub>1</sub>  
25 mm  
**Type:**  
ISO  
**Version:**  
Square  
**Punch:**  
without ejector pin**Order code character**  
= (B)**= 1500**  
**Order No**  
= (5)  
**Order code character**  
= (E)  
**Order No**  
= (10)  
**Order No**  
= (1)  
**Order No**  
= (2)  
**= 22**

### Material:

**HSS**  
**Hardness:**  
Shaft 64 ± 2 HRC  
Head 52 ± 5 HRCASP 23 - ASP 2023  
upon request

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

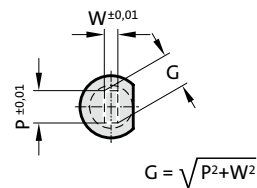
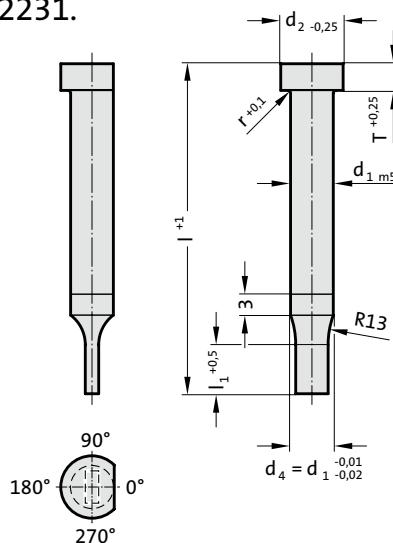
### Execution:

Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.  
The anti-rotation surface parallel to P = 0° as standard.  
Special dimensions on request.

# Punch, stepped, rectangular, ISO 8020



2231.



## 2231. Punch, stepped, rectangular, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
3 / (1)	5	0.5	2.9	8 (1) 10 (2)	0.25	3		●	●	●	●	●
4 / (2)	6	0.8	3.9	8 (1) 13 (3)	0.25	3		●	●	●	●	●
5 / (3)	8	1	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	1.6	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	3.5	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	4.5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	6	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	8	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	10	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	10	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

ASP 23 - ASP 2023

upon request

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

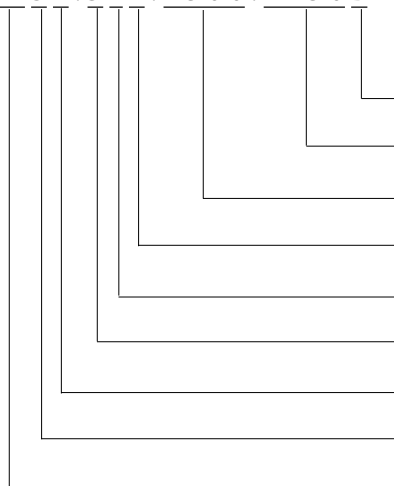
Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.

The anti-rotation surface parallel to P = 0° as standard.

Special dimensions on request.

### Ordering-code (example):

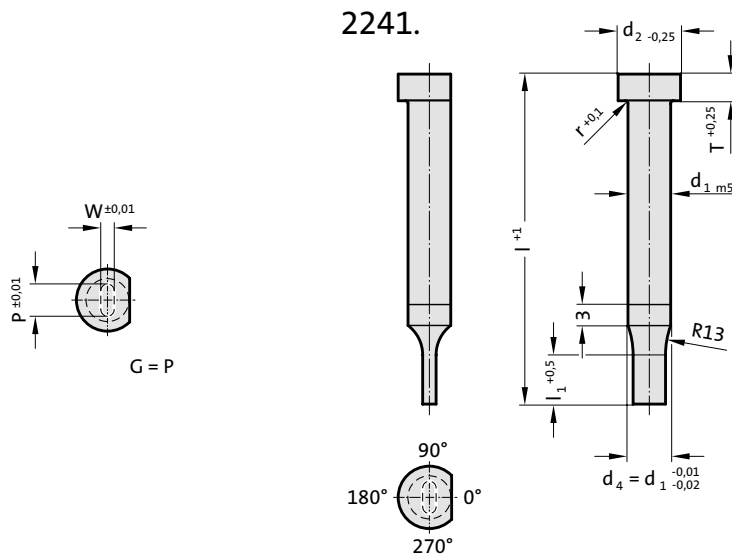
2231.9F4.1500.1150B



<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 11,5 mm	<b>Order code character</b> = 1150
<b>Format: Rectangular, length P</b> P = 15,0 mm	<b>Order code character</b> = 1500
<b>Punch cutting length: l<sub>1</sub></b> 19 mm	<b>Order code character</b> = (4)
<b>Length: l</b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: d<sub>1</sub></b> 20 mm	<b>Order code character</b> = (9)
<b>Type:</b> ISO	<b>Order code character</b> = (1)
<b>Version:</b> Rectangular	<b>Order code character</b> = (3)
<b>Punch:</b> without ejector pin	<b>Order code character</b> = 22



## Punch, stepped, slot, ISO 8020



### 2241. Punch, stepped, slot, ISO 8020

$d_1$ / (Order No)	$d_2$	$W_{min}$	$G_{max}$	$l_1$ / (Order No)	$r$	$T$	$l$ / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
3 / (1)	5	0.5	2.9	8 (1) 10 (2)	0.25	3		●	●	●	●	●
4 / (2)	6	0.8	3.9	8 (1) 13 (3)	0.25	3		●	●	●	●	●
5 / (3)	8	1	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	1.6	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	3.5	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	4.5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	6	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	8	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	10	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	10	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Ordering-code (example):

2 2 4 1 . 10 E 5 . 20 20 . 1 2 2 0 A

Angle  
0°  
Format: Slot, width W  
W = 12,2 mm  
Format: Slot, length P  
P = 20,20 mm  
Punch cutting length:  $l_1$   
25 mm  
Length:  $l$   
80 mm  
Diameter:  $d_1$   
25 mm  
Type:  
ISO  
Version:  
Slot  
Punch:  
without ejector pin

Order code character  
= (A)

= 1220

= 2020

Order No  
= (5)

Order code character  
= (E)

Order No  
= (10)

Order No  
= (1)

Order No  
= (4)

= 22

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

ASP 23 - ASP 2023

upon request

Description of FIBRO materials for tool and die components see at the beginning of Chapter E.

### Execution:

Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.

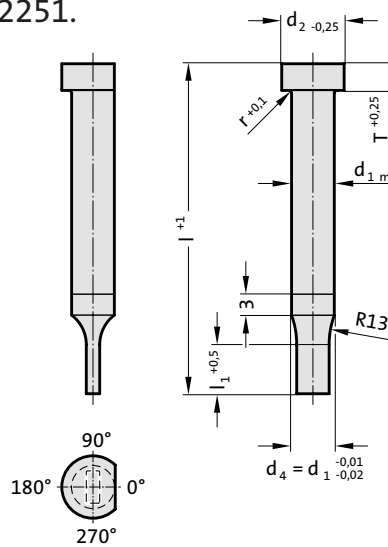
The anti-rotation surface parallel to P = 0° as standard.

Special dimensions on request.

# Punch, stepped, rectangle with radiused corners, ISO 8020



2251.



$$G = \sqrt{(P-1.0)^2 + (W-1.0)^2 + 1}$$

## 2251. Punch, stepped, rectangle with radiused corners, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
3 / (1)	5	0.5	2.9	8 (1) 10 (2)	0.25	3		●	●	●	●	●
4 / (2)	6	0.8	3.9	8 (1) 13 (3)	0.25	3		●	●	●	●	●
5 / (3)	8	1	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	1.6	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	3.5	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	4.5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	6	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	8	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	10	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	10	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

ASP 23 - ASP 2023

upon request

Description of FIBRO materials for tool and die components see at the beginning of Chapter E

### Execution:

Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.

The anti-rotation surface parallel to P = 0° as standard.

Special dimensions on request.

\* For other radius options, see standardised special shapes.

### Ordering-code (example):

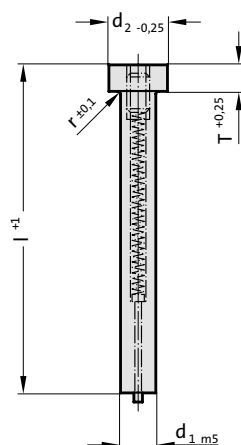
2251.9F4.1215.1100B

Angle:	Order code character
90°	= (B)
Format: Rectangle with radiused corners, width W	
W = 11,0 mm	= 1100
Format: Rectangle with radiused corners, length P	
P = 12,15 mm	= 1215
Punch cutting length: l <sub>1</sub>	Order No
19 mm	= (4)
Length: l	Order code character
90 mm	= (F)
Diameter: d <sub>1</sub>	Order No
20 mm	= (9)
Type:	Order No
ISO	= (1)
Version:	Order No
Rectangle with radiused corners	= (5)
Punch:	
without ejector pin	= 22



## Punch, blank, with ejector pin, ISO 8020

2701.

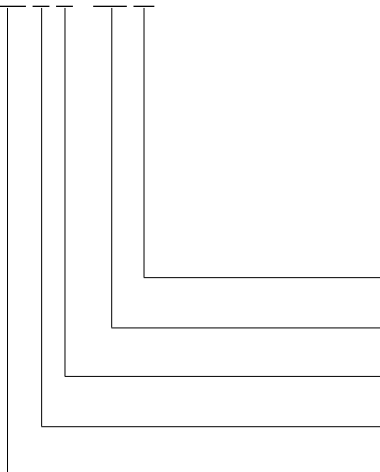


### 2701. Punch, blank, with ejector pin, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
5 / (3)	8	0.3	5		●	●	●	●	●
6 / (4)	9	0.3	5		●	●	●	●	●
8 / (5)	11	0.3	5		●	●	●	●	●
10 / (6)	13	0.3	5		●	●	●	●	●
13 / (7)	16	0.4	5		●	●	●	●	●
16 / (8)	19	0.4	5		●	●	●	●	●
20 / (9)	23	0.4	5		●	●	●	●	●
25 / (10)	28	0.4	5		●	●	●	●	●
32 / (11)	35	0.4	5		●	●	●	●	●

### Ordering-code (example):

**2 7 0 1 . 1 1 G**



**Length: l**  
100 mm  
**Diameter: d<sub>1</sub>**  
32 mm  
**Type:**  
ISO  
**Version:**  
blank  
**Punch:**  
with ejector pin

**Order code character**  
= (G)  
**Order No**  
= (11)  
**Order No**  
= (1)  
**Order No**  
= (0)  
= 27

### Material:

HSS  
Hardness:  
Shaft 64 ± 2 HRC  
Head 52 ± 5 HRC

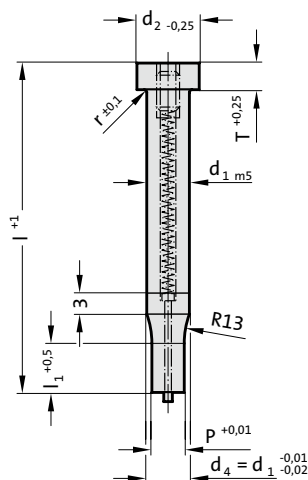
### Execution:

Punch head hot upset-forged. Shoulder and shaft fine ground.  
Special dimensions on request.

# Punch, stepped, round, with ejector pin, ISO 8020



2711.



2711. Punch, stepped, round, with ejector pin, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	P	l <sub>1</sub> / (Order No)	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
5 / (3)	8	1,6-4,9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	2,5-5,9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2,5-7,9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	4,0-9,9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	5,0-12,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	8,0-15,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	12,0-19,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	16,5-24,9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	20,0-31,9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

## Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

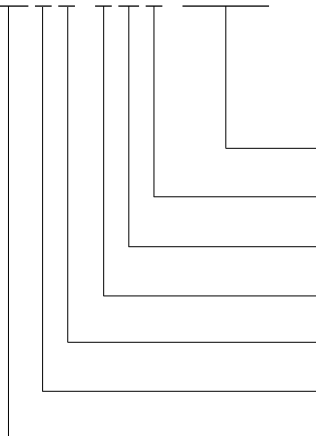
## Execution:

Punch head hot upset-forged. Shoulder, shaft and punch diameter fine ground.

Special dimensions on request.

## Ordering-code (example):

2711.7G4.0700



**Format: Round**

P = Ø 7,0 mm

**Punch cutting length: l<sub>1</sub>**

19 mm

**Length: l**

100 mm

**Diameter: d<sub>1</sub>**

13 mm

**Type:**

ISO

**Version:**

Round

**Punch:**

with ejector pin

= 0700

**Order No**

= (4)

**Order code character**

= (G)

**Order No**

= (7)

**Order No**

= (1)

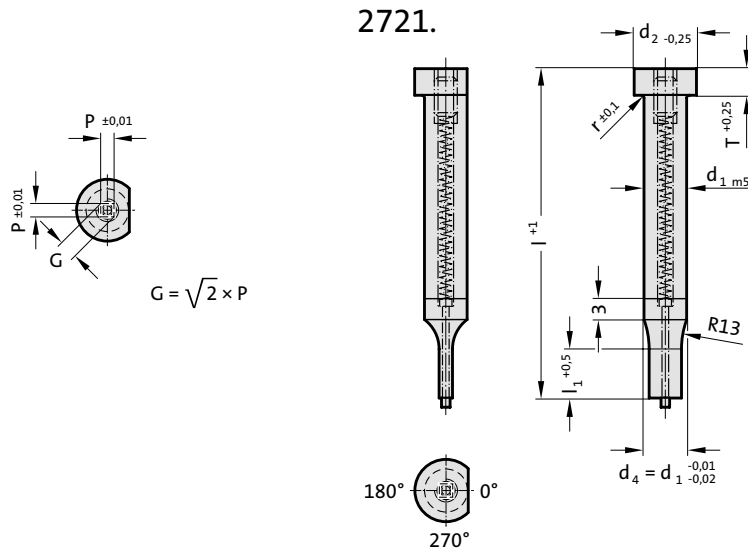
**Order No**

= (1)

= 27



## Punch, stepped, square, with ejector pin, ISO 8020



### 2721. Punch, stepped, square, with ejector pin, ISO 8020

$d_1$ / (Order No)	$d_2$	$P_{min}$	$G_{max}$	$l_1$ / (Order No)	$r$	$T$	$l$ / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
5 / (3)	8	1.6	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	2.5	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2.5	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	4	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	8	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	12	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	16.5	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	20	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Ordering-code (example):

2721.10D5.1650A

Angle:  
0°

Format: Square, length P  
P = 16,5 mm  
Punch cutting length:  $l_1$   
25 mm  
Length: l  
71 mm  
Diameter:  $d_1$   
25 mm  
Type:  
ISO  
Version:  
Square  
Punch:  
with ejector pin

Order code character  
= (A)

= 1650  
Order No  
= (5)  
Order code character  
= (D)  
Order No  
= (10)  
Order No  
= (1)  
Order No  
= (2)  
= 27

### Material:

HSS  
Hardness:  
Shaft 64 ± 2 HRC  
Head 52 ± 5 HRC

### Execution:

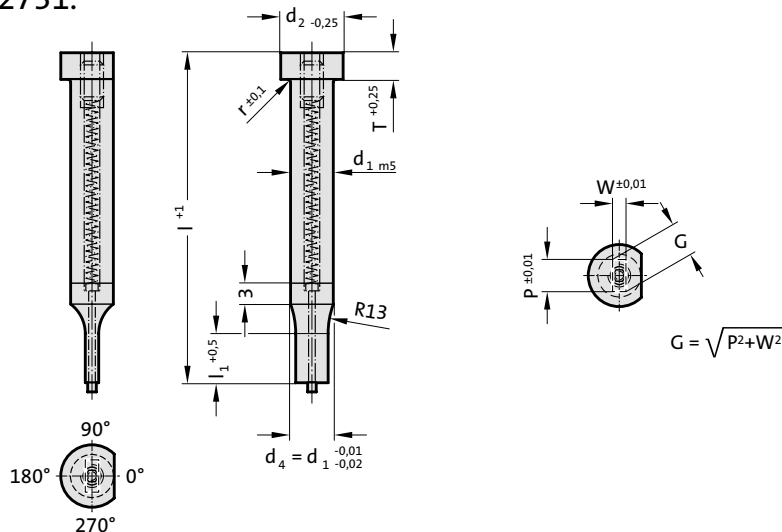
Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.  
The anti-rotation surface parallel to P = 0° as standard.  
Special dimensions on request.



# Punch, stepped, rectangular, with ejector pin, ISO 8020



2731.



## 2731. Punch, stepped, rectangular, with ejector pin, ISO 8020

$d_1$ / (Order No)	$d_2$	$W_{min}$	$G_{max}$	$l_1$ / (Order No)	$r$	$T$	$l$ / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
5 / (3)	8	1.6	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	2.5	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2.5	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	4	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	8	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	12	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	16.5	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	20	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Material:

HSS

Hardness:

Shaft  $64 \pm 2$  HRC

Head  $52 \pm 5$  HRC

### Execution:

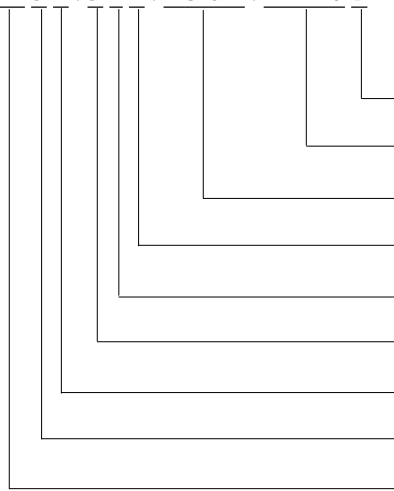
Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.

The anti-rotation surface parallel to  $P = 0^\circ$  as standard.

Special dimensions on request.

### Ordering-code (example):

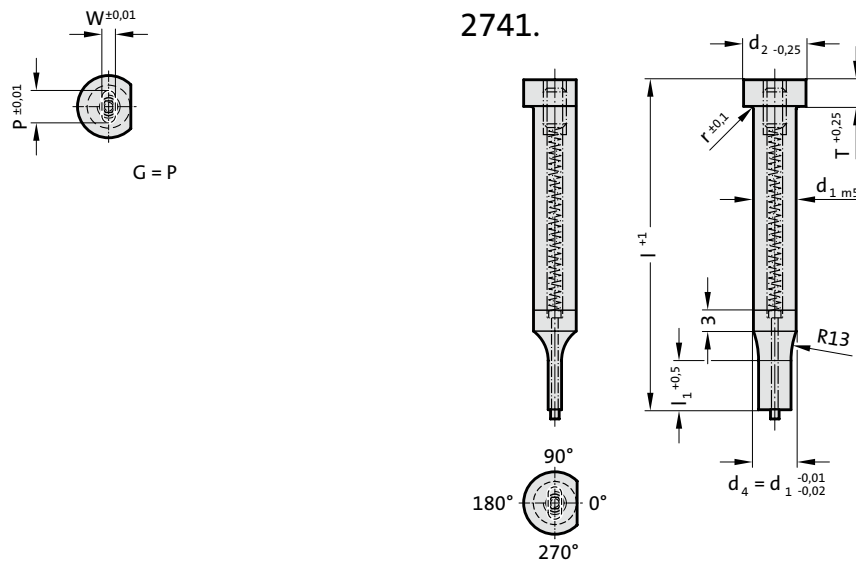
2731.9F4.1504.1210B



<b>Angle:</b> 90°	<b>Order code character</b> = (B)
<b>Format: Rectangular, width W</b> W = 12,1 mm	<b>Order code character</b> = 1210
<b>Format: Rectangular, length P</b> P = 15,04 mm	<b>Order code character</b> = 1504
<b>Punch cutting length: <math>l_1</math></b> 19 mm	<b>Order No</b> = (4)
<b>Length: <math>l</math></b> 90 mm	<b>Order code character</b> = (F)
<b>Diameter: <math>d_1</math></b> 20 mm	<b>Order No</b> = (9)
<b>Type:</b> ISO	<b>Order No</b> = (1)
<b>Version:</b> Rectangular	<b>Order No</b> = (3)
<b>Punch:</b> with ejector pin	<b>Order No</b> = 27



## Punch, stepped, slot, with ejector pin, ISO 8020



### 2741. Punch, stepped, slot, with ejector pin, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	W <sub>min</sub>	G <sub>max</sub>	l <sub>1</sub> / (Order No)	r	T	l / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
5 / (3)	8	1.6	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	2.5	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2.5	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	4	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	8	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	12	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	16.5	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	20	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

### Ordering-code (example):

2 7 4 1 . 10 D 4 . 2 0 4 0 . 16 5 0 B

Angle  
90°

Format: Slot, width W

W = 16,5 mm

Format: Slot, length P

P = 20,4 mm

Punch cutting length: l<sub>1</sub>

19 mm

Length: l

71 mm

Diameter: d<sub>1</sub>

25 mm

Type:

ISO

Version:

Slot

Punch:

with ejector pin

Order code character  
= (B)

= 1650

= 2040

Order No

= (4)

Order code character

= (D)

Order No

= (10)

Order No

= (1)

Order No

= (4)

= 27

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

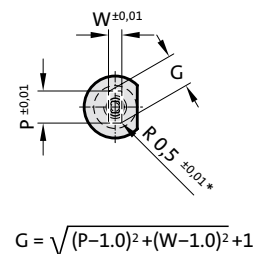
Head 52 ± 5 HRC

### Execution:

Punch head hot upset-forged. Shoulder, shaft and punch shape fine ground.

The anti-rotation surface parallel to P = 0° as standard.

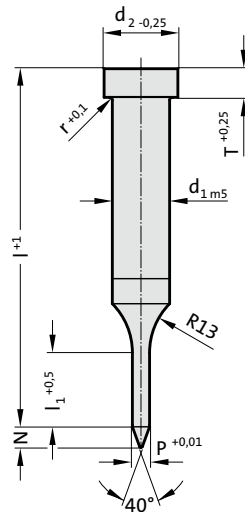
Special dimensions on request.



$d_1$ / (Order No)	$d_2$	$W_{\min}$	$G_{\max}$	$l_1$ / (Order No)	$r$	T	$l$ / (Order Code character)	71 (D)	80 (E)	90 (F)	100 (G)	120 (J)
5 / (3)	8	1.6	4.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
6 / (4)	9	2.5	5.9	13 (3) 19 (4)	0.3	5		●	●	●	●	●
8 / (5)	11	2.5	7.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
10 / (6)	13	4	9.9	19 (4) 25 (5)	0.3	5		●	●	●	●	●
13 / (7)	16	5	12.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
16 / (8)	19	8	15.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
20 / (9)	23	12	19.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
25 / (10)	28	16.5	24.9	19 (4) 25 (5)	0.4	5		●	●	●	●	●
32 / (11)	35	20	31.9	25 (5) 30 (6)	0.4	5		●	●	●	●	●

# Pilot pin with tapered tip, ISO 8020

2261.

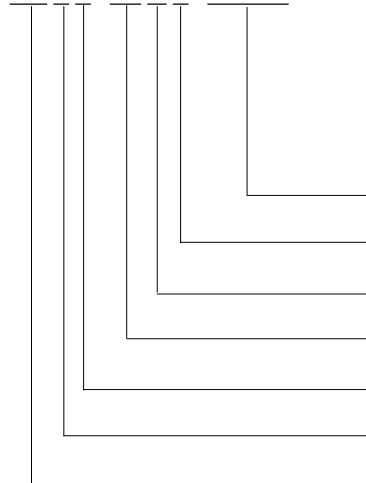


## 2261. Pilot pin with tapered tip, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	T	P	l <sub>1</sub> / (Order No)	N	l / (Order Code character)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)	110 (H)	125 (K)	140 (I)
5 / (3)	8	5	1,0-4,9	13 (3)	4		●	●						
6 / (4)	9	5	1,6-5,9	13 (3)	5		●	●	●					
8 / (5)	11	5	2,5-7,9	13 (3)	6		●	●	●	●				
10 / (6)	13	5	4,0-9,9	13 (3) 19 (4)	8		●	●	●	●	●			
13 / (7)	16	5	5,0-12,9	13 (3) 19 (4)	10		●	●	●	●	●	●		
16 / (8)	19	5	8,0-15,9	13 (3) 19 (4) 25 (5)	15			●	●	●	●	●	●	●
20 / (9)	23	5	12,0-19,9	13 (3) 19 (4) 25 (5)	20			●	●	●	●	●	●	●
25 / (10)	28	5	16,5-24,9	13 (3) 19 (4) 25 (5)	25			●	●	●	●	●	●	●
32 / (11)	35	5	20,0-31,9	19 (4) 25 (5)	30				●	●	●	●	●	●

### Ordering-code (example):

2 2 6 1 . 10 D 3 . 17 5 0



**Format:** Round

P = Ø 17,5 mm

**Punch cutting length:** l<sub>1</sub>

13 mm

**Length:** l

71 mm

**Diameter:** d<sub>1</sub>

25 mm

**Type:**

ISO

**Version:**

Pilot pin with tapered tip

**Punch:**

without ejector pin

= 1750

**Order No**

= (3)

**Order code character**

= (D)

**Order No**

= (10)

**Order No**

= (1)

**Order No**

= (6)

= 22

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

### Execution:

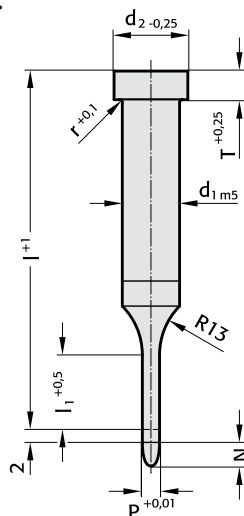
Head hot upset-forged. Shoulder, shaft and pilot fine ground.

Special dimensions on request.

# Pilot pin with parabolic tip, ISO 8020



2271.



## 2271. Pilot pin with parabolic tip, ISO 8020

d <sub>1</sub> / (Order No)	d <sub>2</sub>	T	P	l <sub>1</sub> / (Order No)	l / (Order Code character)	50 (A)	56 (B)	63 (C)	71 (D)	80 (E)	90 (F)	100 (G)
5 / (3)	8	5	1,0-4,9	10 (2) 13 (3)		●	●	●	●			
6 / (4)	9	5	1,6-5,9	10 (2) 13 (3)		●	●	●		●		
8 / (5)	11	5	2,5-7,9	10 (2) 13 (3)		●	●	●	●	●		
10 / (6)	13	5	4,0-9,9	10 (2) 13 (3) 19 (4)		●	●	●		●		●
13 / (7)	16	5	5,0-12,9	10 (2) 13 (3) 19 (4)		●	●	●	●	●	●	●
16 / (8)	19	5	8,0-15,9	13 (3) 19 (4)		●	●	●	●	●	●	●
20 / (9)	23	5	12,0-19,9	13 (3) 19 (4)			●	●	●	●	●	●
25 / (10)	28	5	16,5-24,9	13 (3) 19 (4)			●	●		●	●	●
32 / (11)	35	5	20,0-31,9	19 (4)					●	●	●	●

### Material:

HSS

Hardness:

Shaft 64 ± 2 HRC

Head 52 ± 5 HRC

### Execution:

Head hot upset-forged, shoulder, shaft and pilot fine ground.

Special dimensions on request.

### Note:

The 2 mm length provides full guidance before the blanking punch contacts the sheet metal.

### Length of parabolic tip N:

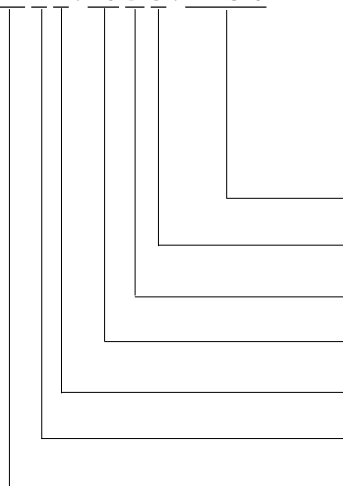
= 8 mm where P ≤ 10 mm

= 12 mm where P 10,1 mm - 15 mm

= 15 mm where P > 15 mm

### Ordering-code (example):

2 2 7 1 . 1 0 D 3 . 1 7 5 0



Format: Round

P = Ø 17,5 mm

Punch cutting length: l<sub>1</sub>

13 mm

Length: l

71 mm

Diameter: d<sub>1</sub>

25 mm

Type:

ISO

Version:

Pilot pin with parabolic tip

Punch:

without ejector pin

= 1750

Order No

= (3)

Order code character

= (D)

Order No

= (10)

Order No

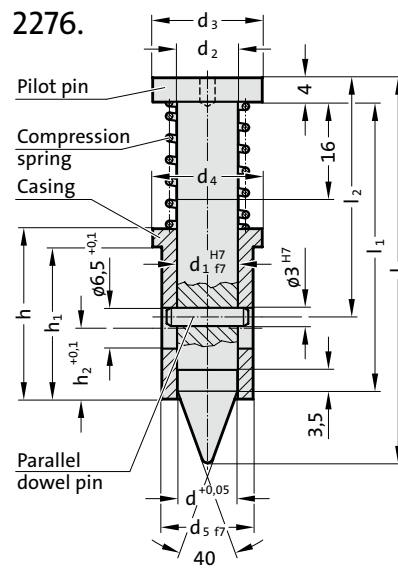
= (1)

Order No

= (7)

= 22

## Pilot unit to Mercedes-Benz Standard

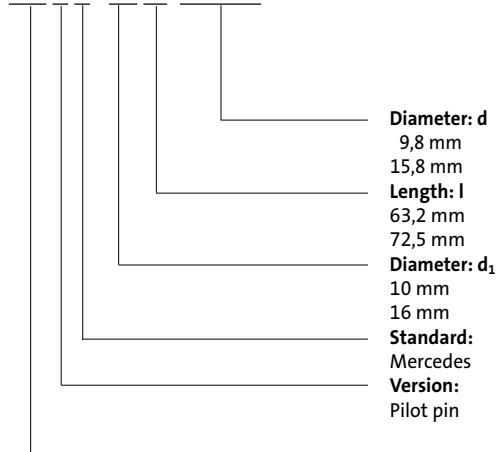


## 2276. Pilot unit to Mercedes-Benz Standard

Order No	d	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	d <sub>4</sub>	d <sub>5</sub>	h	h <sub>1</sub>	h <sub>2</sub>	l <sub>1</sub>	l <sub>2</sub>	l	Spring force preloaded [daN]	Spring force compressed [daN]
2276.1.A.0980	9.8	10	10	18	18	15	28	25	12	47.5	39.3	63.2	4.9	6.2
2276.2.B.1580	15.8	16	16	24	30	26	28	25	12	54.5	46.3	72.5	4.8	5.6

Ordering-code (example):

2276.1.A.0980


$$\begin{aligned} &= 0980 \\ &= 1580 \end{aligned}$$

Order code character  
= (A)

Order No  
= (1)  
= (2)

Order No  
= (6)

**Order No**  
**= (7)**

= 22

**Description:**

The pilot unit provides exact positioning of sheet metal parts.

There are 2 sizes.

The pilot unit 10 can be used for a hole diameter of 5 to 10 mm and is available as a finished item, 9.8 mm diameter.

The pilot unit 16 is used for diameter > 10 - 16 mm and is available as a blank, 15.8 mm diameter.

Smaller diameters have to be ground by the tool making department.

**Note:**

The pilot unit consists of:

Pilot pin, sleeve, compression spring, dowel pin.

