



360° PROJECTS BY INOVAN

# COILED SPRING PINS SLOTTED PINS TUBULAR PRODUCTS



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360° PROJECTS BY INOVAN //--

THINK. THINKING IT THROUGH. THINKING IT THROUGH RIGHT FROM THE START.  
THERE REALLY ARE DIFFERENCES //--

During implementation at the latest. When things take longer, become more expensive or turn out to be much more difficult than expected. So, by all means it is a kind of art: the art of thinking it through right from the start. It has a lot to do with years of experience, deeper understanding and overall implementation expertise.

Our coiled spring pins, slotted pins and tubular products impressively demonstrate what these success factors really mean and what solutions that have been thought through right from the start really look like.

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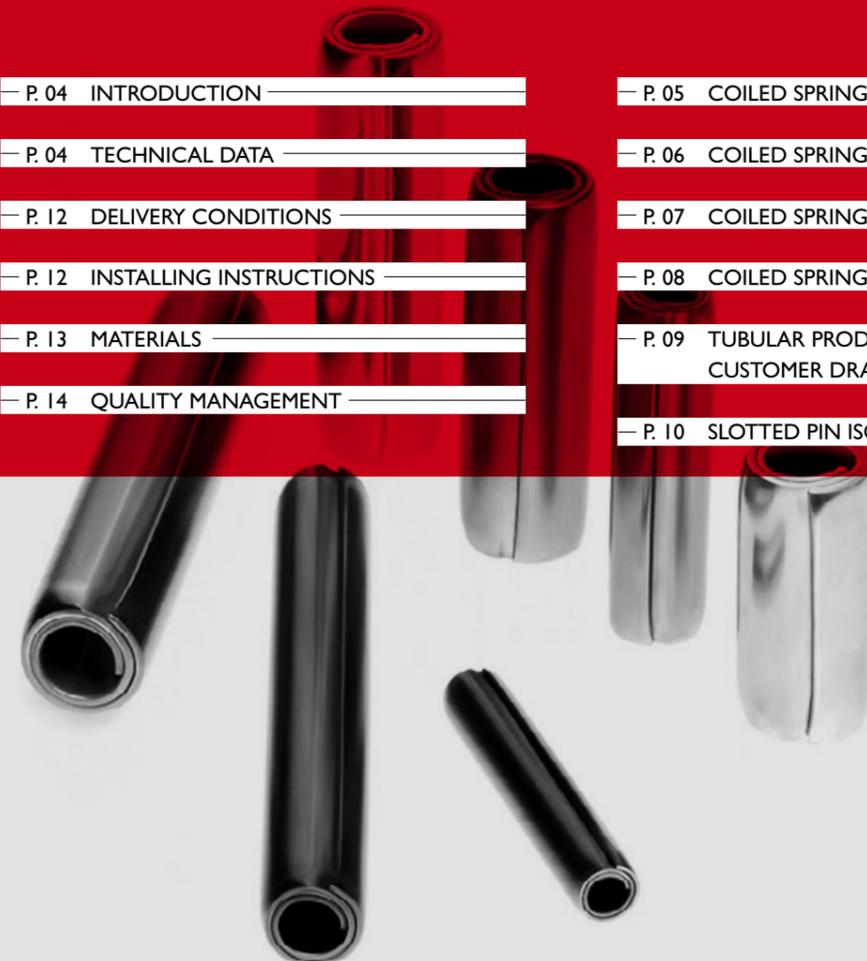
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THINKING IT THROUGH RIGHT FROM THE START

# COILED SPRING PINS SLOTTED PINS TUBULAR PRODUCTS

INTRODUCTION

60 years of experience are contained in our radial, elastic fastener elements as well as continuous improvement of quality. Coiled spring pins are rolled from strip material and replace joiner pins, stop pins, drive pins and pivot pins. Slotted pins leave a split along their longitudinal axis and are also rolled from strip material.

Our ISO standardised coiled spring pins and slotted pins can be delivered with all the established surface finishings. Therefore they are a suitable economic and technical alternative to grooved pins, cylinder pins, rivets, screws and bolts. Along with the ISO standardised coiled spring pins and slotted pins, we also offer tubular products. Upon request these can also be specified and customised to your individual requirements.

COILED SPRING PINS – TECHNICAL DATA //--

REDUCING PRODUCTION COST THROUGH THE USE OF COILED SPRING PINS ACCORDING TO ISO 8750 AND ISO 8748 //--

HIGH COST SAVING FOR TECHNOLOGICAL CONNECTIONS

The unique spring characteristics of the spiral of the coiled spring pin have a shock, impact and vibration absorbing effect and give any connection high fatigue properties against shearing off and drifting. This applies to loads in any radial direction.

RATIONAL BORES

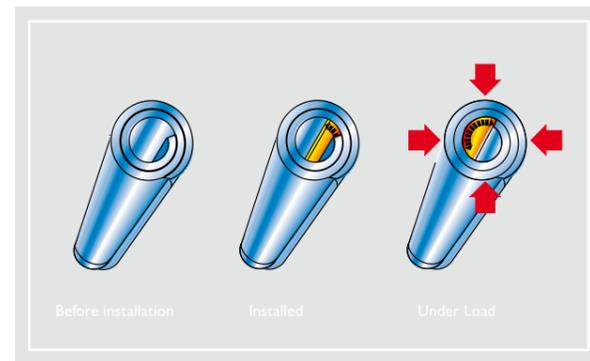
With the coiled spring pin high fitting accuracy is achieved at single bores by means of a twist drill or non-cutting by pressing, diecasting or injection moulding.

Cost intensive operating cycles as pilot drilling, and reaming, as well as the quotas of rejects connected with that, belong to the past.

At being inserted into the bore, the coiled spring pin is radial-elastically compressed. Through that high boring tolerances (H 12) are compensated and alignment faults and non-circular bores are aligned. The coiled spring pin is non-positively and securely fitted into the bore.

REDUCING THE QUOTAS OF REJECTS

Owing to the radial spring behaviour of the coiled spring pin cracking of, for example, thin-walled, brittle and hardened component parts is avoided. For especially sensitive components we developed a special solution – the Superelastic coiled spring pin with 1.5 windings.



AUTOMATIC PROCESS ABILITY

Compared to other radial-elastic connection elements the coiled spring pin is of a closed sleeve shape and chamfered at both ends in all diameter ranges.

Owing to that the coiled spring pins can be sorted and separated without problem. Interlocking is impossible. Aligning and turning round is not necessary.

HIGHEST PRODUCTIVITY

Also after repeated pressing in and out the pin connection can be reused with almost unchanged fixed seat, eg. at repairs. This is confirmed by tests of the Technische Hochschule Aachen Mounted.

COILED SPRING PIN ISO 8750-ST AND ISO 8750-A //--

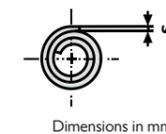
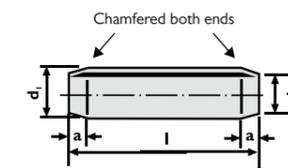
NOMINAL DIAMETER 1)		0,8	1	1,2	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16
Before mounting	d <sub>1</sub> min.	0,85	1,05	1,25	1,62	2,13	2,65	3,15	3,67	4,20	5,25	6,25	8,30	10,35	12,40	14,45	16,45
	d <sub>1</sub> max.	0,91	1,15	1,35	1,73	2,25	2,78	3,30	3,84	4,40	5,50	6,50	8,63	10,80	12,85	14,95	17,00
	d <sub>2</sub> max.	0,75	0,95	1,15	1,40	1,90	2,40	2,90	3,40	3,90	4,85	5,85	7,80	9,75	11,70	13,60	15,60
	a ≈	0,30	0,30	0,40	0,50	0,70	0,70	0,90	1,00	1,10	1,30	1,50	2,00	2,50	3,00	3,50	4,00
	s	0,07	0,08	0,10	0,13	0,17	0,21	0,25	0,29	0,33	0,42	0,50	0,67	0,84	1,00	1,20	1,30
Min. Shear-off force <sup>2)</sup> Two-shr.	kN <sup>3)</sup>	0,40	0,60	0,90	1,45	2,50	3,90	5,50	7,50	9,60	15,0	22,0	39,0	62,0	89,0	120	155
	kN <sup>4)</sup>	0,30	0,45	0,65	1,05	1,90	2,90	4,20	5,70	7,60	11,5	16,8	30,0	48,0	—	—	—

LENGTH 1 <sup>5)</sup>	TOLER.	0,8	1	1,2	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16
4																	
5																	
6	± 0,25																
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70																	
75																	
80																	
85	± 0,75																
90																	
95																	
100																	
120																	
140																	
160																	

Range of the commercially available lengths

Special diameter and special length on request.

- The diameter of the location hole must be equal to the nominal diameter of the corresponding pin by taking the tolerance field H 12 into account. For coiled spring pins with a nominal diameter of d<sub>1</sub> ≤ 1.2 mm, the tolerance field H 10 applies to the location hole.
- In the individual case it must be checked, if depending on the constructive conditions the indicated shear force may be taken into account. Controlling of the shear force takes place according to ISO 8749.
- Shear-off values for coiled spring pins ISO 8750-St (steel), ISO 8748-St (steel).
- Shear-off values for coiled spring pins ISO 8750-A (austenitic stainless steel) Ø 0.8 to 10.
- Coiled spring pins of austenitic stainless steel (A) at a diameter of 6–10 mm can only be manufactured in lengths of at max. 65 mm.



Order example for coiled spring pins ISO 8748-St (steel) with:  
Nominal diameter d<sub>1</sub> = 6 mm and length l = 30 mm  
Coiled spring pin – ISO 8750 – 6 x 30 – St.

Order example for coiled spring pins ISO 8750-A (austenitic stainless steel) with:  
Nominal diameter d<sub>1</sub> = 6 mm and length l = 30 mm  
Coiled spring pin – ISO 8750 – 6 x 30 – A

Dimensions in mm

COILED SPRING PIN ISO 8748-ST //--



NOMINAL DIAMETER 1)		1,5	2	2,5	3	3,5	4	5	6	8	10	12	14
Before mounting	d <sub>1j</sub> min.	1,61	2,11	2,62	3,12	3,64	4,15	5,15	6,18	8,25	10,30	12,35	14,40
	d <sub>1j</sub> max.	1,71	2,21	2,73	3,25	3,79	4,30	5,35	6,40	8,55	10,65	12,75	14,85
	d <sub>2j</sub> max.	1,40	1,90	2,40	2,90	3,40	3,90	4,85	5,85	7,80	9,75	11,70	13,60
	a ≈	0,50	0,70	0,70	0,90	1,00	1,10	1,30	1,50	2,00	2,50	3,00	3,50
	s	0,17	0,22	0,28	0,33	0,39	0,45	0,56	0,67	0,90	1,10	1,30	1,60
Min. Shear-off force <sup>2)</sup> Two-shr.	kN <sup>3)</sup>	1,9	3,5	5,5	7,6	10	13,5	20	30	53	84	120	165

High duty application: Coiled spring pins ISO 8750 and ISO 8748.

Coiled spring pins are rolled of band material and replace rivets, screws, bolts and similar connection elements. Coiled spring pins are applicable as connecting pin, pilot pin, driving pin and pivot pin.

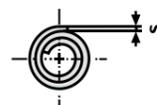
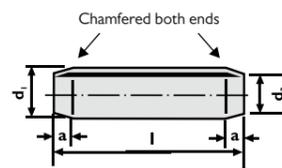
LENGTH l	TOLER.	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14
4													
5													
6	± 0,25												
8													
10													
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26	± 0,5												
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65													
70													
75													
80	± 0,75												
85													
90													
95													
100													

Special diameter and special length on request.

1) The diameter of the location hole must be equal to the nominal diameter of the corresponding pin by taking the tolerance field H 12 into account. For coiled spring pins with a nominal diameter of d<sub>1</sub> ≤ 1.2 mm, the tolerance field H 10 applies to the location hole.

2) In the individual case it must be checked, if depending on the constructive conditions the indicated shear force may be taken into account. Controlling of the shear force takes place according to ISO 8749.

3) Shear-off values for coiled spring pins ISO 8750-St (steel), ISO 8748-St (steel).



Dimensions in mm

Order example for coiled spring pins ISO 8748-St (steel) with:  
Nominal diameter d<sub>1</sub> = 6 mm and length l = 30 mm  
Coiled spring pin – ISO 8748 – 6 x 30 – St.

COILED SPRING PIN SUPERELASTIC-ST/-A //--



NOMINAL DIAMETER 1)		1,5	2	2,5	3	3,5	4	5	6	8	10
Before mounting	d <sub>1j</sub> min.	1,60	2,15	2,65	3,15	3,67	4,20	5,25	6,25	8,50	10,50
	d <sub>1j</sub> max.	1,70	2,25	2,87	3,40	3,92	4,50	5,57	6,72	8,80	10,80
	d <sub>2j</sub> max.	1,40	1,90	2,40	2,90	3,40	3,90	4,85	5,85	7,80	9,75
	a ≈	0,50	0,70	0,70	0,90	1,00	1,10	1,30	1,50	2,00	2,50
	s	0,10	0,13	0,17	0,21	0,25	0,29	0,33	0,42	0,50	0,67
Min. Shear-off force <sup>2)</sup> Two-shr.	kN <sup>3)</sup>	0,60	1,00	1,60	2,40	3,30	4,40	6,30	9,60	15,30	25,50
	kN <sup>4)</sup>	0,42	0,70	1,12	1,68	2,31	3,08	4,41	6,72	—	—

For stress prawn application: Coiled spring pin Superelastic

Through its 1.5-fold spiral winding the coiled spring pin Superelastic achieves the maximum radial elasticity. Owing to this elasticity and the fact that we can also manufacture these pins according to your requirements, fissuring or cracking of component parts is avoided. The coiled spring pin Superelastic is mainly used in thinwalled and brittle component parts of metal, plastic or ceramics.

LENGTH l	TOLER.	1,5	2	2,5	3	3,5	4	5	6	8	10
10											
12											
14											
16											
18											
20											
22											
24											
26											
28	± 0,5										
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32											
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50											
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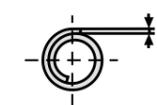
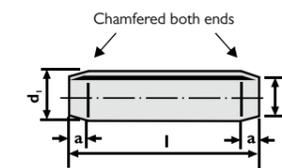
Special diameter and special length on request.

1) The diameter of the location hole must be equal to the nominal diameter of the corresponding pin under consideration of the tolerance field H 12.

2) In the individual case it must be checked, if depending on the constructive conditions the indicated shear force may be taken into account. Controlling of the shear force takes place according to ISO 8749.

3) Shear-off values for coiled spring pins Superelastic-St (steel).

4) Shear-off values for coiled spring pins Superelastic-A (austenitic stainless steel).



Dimensions in mm

Order example for coiled spring pins Superelastic with:  
Nominal diameter d<sub>1</sub> = 6 mm and length l = 40 mm  
Coiled spring pin Superelastic – 6 x 40 – St.

Order example for coiled spring pins Superelastic A (austenitic, stainless steel) with:  
Nominal diameter d<sub>1</sub> = 6 mm and Length l = 40 mm  
Coiled spring pin Superelastic – 6 x 40 – A

COILED SPRING PIN TURBO-ST/-A //--



NOMINAL DIAMETER 1)		2	2,5	3	3,5	4	5	6
Vor dem Einbau	d <sub>1j</sub> min.	2,13	2,65	3,15	3,67	4,20	5,25	6,25
	d <sub>1j</sub> max.	2,25	2,78	3,30	3,84	4,40	5,50	6,50
	d <sub>2j</sub> max.	1,90	2,40	2,90	3,40	3,90	4,85	5,85
	a ≈	0,70	0,70	0,90	1,00	1,10	1,30	1,50
	s	0,17	0,21	0,25	0,29	0,33	0,42	0,50
Mind. Abscherkraft <sup>2)</sup> zweischn.	kN <sup>3)</sup>	2,25	3,51	4,95	6,75	8,64	13,50	19,80
	kN <sup>4)</sup>	1,58	2,46	3,47	4,73	6,05	9,45	13,86

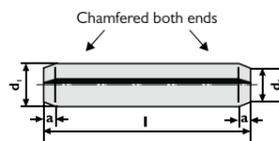
Uniform diameter coiled spring pin Turbo

Through the design of the coiled spring pin Turbo with the circular, closed cross section and the embedded end of the outer winding, abrasion at the bore hole wall is avoided and the useful life of eg. hinge joints is extended. When using the coiled spring pin Turbo, it must be taken care that the loose seat is located in the central part of the connection.

LENGTH l	TOLER.	2	2,5	3	3,5	4	5	6
6								
8	± 0,25							
10								
12								
14								
16								
18								
20								
22	± 0,5							
24								
26								
28								
30								

Special diameter and special length on request.

- 1) The diameter of the location hole must be equal to the nominal diameter of the corresponding pin under consideration of the tolerance field H 12.
- 2) In the individual case it must be checked, if depending on the constructive conditions the indicated shear force may be taken into account. Controlling of the shear force takes place according to ISO 8749.
- 3) Shear-off values of coiled spring pins Turbo-St (steel).
- 4) Shear-off values for coiled spring pins Turbo-A length l = 26 mm (austenitic stainless steel).



Dimensions in mm

Order example for coiled spring pins Turbo-St (steel) with:  
Nominal diameter d<sub>1</sub> = 6 mm and length l = 26 mm  
Coiled spring pin Turbo – 6 x 26 – St.

Order example for coiled spring pins Turbo-A (austenitic stainless steel) with:  
Nominal diameter d<sub>1</sub> = 6 mm and length l = 26 mm  
Coiled spring pin Turbo – 6 x 26 – A

TUBULAR PRODUCTS ACCORDING TO CUSTOMER DRAWING //--



Tubular products in various materials and dimensions

Compression limiters reinforcement sleeves:

Tubular products are used everywhere, where parts of plastic must be screwed to other parts the bore is reinforced to eliminate compression under high torque loads. Further applications are for distance spacers and dowel bushings.

PRODUCT

Tubular products are produced from cold-rolled strip material. Whether they are used for bearings, reinforcing holes, dowels, or distance spacers our tubular products are used.

With these precision component parts we offer economical solutions for tasks in many industrial areas as, for example, automotive industry, plastics industry, fine precision mechanics and others. Sleeves do not interlock and can therefore be automatically fed without problem.

SPECIAL SOLUTIONS

- » Longitudinal slot straight, for subsequent pressing into plastic.
- » Longitudinal slot straight closely fitting, for extrusion coating with plastic.
- » Longitudinal slot according to the customer's requirement.
- » Chamfering or radii are possible.
- » According to the technical requirements sleeves can be delivered with punchings and stampings.

MATERIAL

- » Cold rolled strip DIN EN 10139
- » Spring band steel according to DIN EN 10132-4
- » Spring band steel of fine steel stainless according to DIN EN 10151
- » Further materials on request.

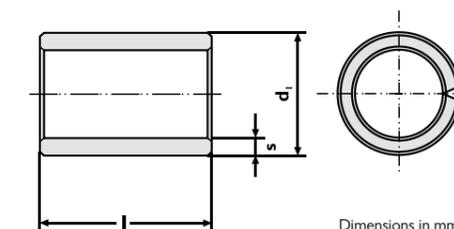
HARDNESS

On customer's request sleeves of spring band steel according to DIN EN 10132-4 can be quenched and subsequently drawn to 420 HV to 520 HV. Other hardness on request.

DIMENSIONS

d <sub>1</sub>	d <sub>1</sub> - Toler.	l	s
6,0 bis 10,0	</= 0,15	</= 0,2	0,6 bis 1,5
> 10,0 bis 16,0			0,8 bis 2,5

The specified data are interdependent. All dimensions before surface finishing.



Dimensions in mm

SLOTTED PIN ISO 8752-ST //--

NOMINAL DIAMETER 1)		1	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16	18	20
Before mounting	$d_{11}$ max.	1,30	1,80	2,40	2,90	3,50	4,00	4,60	5,60	6,70	8,80	10,80	12,80	14,80	16,80	18,90	20,90
	$d_{11}$ min.	1,20	1,70	2,30	2,80	3,30	3,80	4,40	5,40	6,40	8,50	10,50	12,50	14,50	16,50	18,50	20,50
	$d_2$ 7)	0,80	1,10	1,50	1,80	2,10	2,30	2,80	3,40	4,00	5,50	6,50	7,50	8,50	10,50	11,50	12,50
	a max.	0,35	0,45	0,55	0,60	0,70	0,80	0,85	1,10	1,40	2,00	2,40	2,40	2,40	2,40	2,40	3,40
	a min.	0,15	0,25	0,35	0,40	0,50	0,60	0,65	0,90	1,20	1,60	2,00	2,00	2,00	2,00	2,00	3,00
s	0,20	0,30	0,40	0,50	0,60	0,75	0,80	1,00	1,20	1,50	2,00	2,50	3,00	3,00	3,50	4,00	
Min. Shear-off force <sup>2)</sup> Two-shr.	kN <sup>3)</sup>	0,7	1,58	2,82	4,38	6,32	9,06	11,24	17,54	26,04	42,76	70,16	104,1	144,7	171	222,5	280,6

LENGTH l 5)	TOLER.	1	1,5	2	2,5	3	3,5	4	5	6	8	10	12	14	16	18	20
4																	
5																	
6	± 0,25																
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140																	

Special diameter and special lengths on request.  
Dimensions are optionally available also in stainless fine steel. On request also available according to ISO 13337.

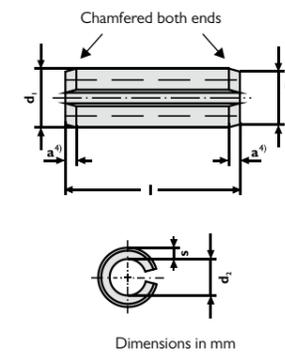


Slotted pins in various materials and dimensions.

Extended delivery program: Slotted pins ISO 8752

The pin is slotted through its longitudinal axis forming a hollow cylinder made from rolled strip material. It is a useful supplement to our wide range of products. In order to avoid sliding into each other and interlocking at installing and processing the slotted pins can be delivered with an antilocking slot.

- 1) The diameter of the location hole must be equal to the nominal diameter of the corresponding pin under consideration of the tolerance field H 12.
- 2) In the individual case it must be checked, if depending on the constructive conditions the indicated shear force may be taken into account. Controlling of the shear force takes place according to ISO 8749.
- 3) Shear-off values for slotted pins ISO 8752-St (steel).
- 4) For slotted pins with a nominal diameter  $\geq 10$  mm, at the option of the manufacturer, also 1 chamfer is permitted.
- 5)  $d_3 <$  nominal diameter.
- 6) Explanation page I2.
- 7) Only for information.



Order example for slotted pins ISO 8752-St (steel) slot normal case<sup>6)</sup> with:  
Nominal diameter  $d_1 = 6$  mm and length  $l = 30$  mm  
Slotted pin – ISO 8752 6 x 30 – St.

Order example for slotted pins ISO 8752-St (steel) in non interlocking design<sup>6)</sup> with:  
Nominal diameter  $d_1 = 6$  mm and length  $l = 30$  mm  
Slotted pin – ISO 8752 6 x 30 – N(A) – St.

Dimensions in mm



TECHNICAL DELIVERY CONDITIONS //--

**Surface condition Steel (St)**

Without special treatment, i. e. if nothing else has been provided for between the supplier and the customer, the connection elements are to be delivered as tempered, conditioned with slushing oil. In case connecting elements are coated, the coating process should be chosen in such a way that hydrogen brittleness is avoided. In case connection elements are galvanized or phosphatized, they must immediately after this process be correspondingly reprocessed, in order to prevent damaging hydrogen brittleness. It may, however, not be guaranteed that the connection elements are absolutely free of hydrogen brittleness (see ISO 4042). All tolerances apply before the application of the coating. Possible surface refinements are: scouring and polishing, galvanizing, chromizing, tinning (solderable), phosphatizing, copperplating, nickel-plating and brass coating, Delta Tone, Geomet.

**Austenitic stainless steel (A)**

Bright, i. e. the connecting elements must be delivered as manufactured.

**Outer condition**

The connecting elements must show an equal quality and be free of irregularities or harmful defects. Connecting elements must be burr-free.

**Checking the shear strength**

The shear strength test must be carried out in accordance with ISO 8749.

**Acceptance inspection**

To the acceptance inspection ISO 3269 applies.

**Hardness test**

For the hardness test ISO 6507-1 is applicable.

INSTALLING INSTRUCTIONS 1) //--

**Bore tolerances**

For the diameter of the location hole the tolerance field H12 was taken as a basis. The nominal diameter of the coiled spring pins / slotted pins at the same time is the nominal diameter of the corresponding location hole.

PERMISSIBLE DEVIATIONS (MM) OF THE LOCATION HOLES OF NOMINAL DIAMETER

Nominal diameter	over					
	0,8 to 1 <sup>2)</sup>	1,2 to 3	3 to 6	6 to 10	10 to 18	18 to 20
Tolerance field	H10					
Permissible dev.	+ 0,04	+ 0,10	+ 0,12	+ 0,15	+ 0,18	+ 0,21

When using it as a joint pin, it must be taken care that the loose seat, if possible, is located in the central piece and the fixed seat in the fork piece. The useful bore tolerance must be determined by tests.

1) Applies to coiled spring pins ISO 8750 and ISO 8748, Reduced Diameter, Superelastic and coiled spring pin Turbo, slotted pins ISO 8752 and ISO 13337. Not applicable for sleeves according to customer drawing as on page 11.

2) Only for coiled spring pins ISO 8750 and ISO 8748.

INSTALLING INSTRUCTIONS //--

**Slot shape slotted pin ISO 8752**

**Normal case**

Shape and width of the slot at the option of the manufacturer. At a stright slot the slotted pins may interlock.

**Shape N**

Slotted pins with a slot shape and /or width, by which non interlocking is guaranteed, can be agreed upon between supplier and customer.

MATERIALS //--

**Coiled spring pin ISO 8750 and ISO 8748, Reduced Diameter, Superelastic and coiled spring pin Turbo.**

**Material 1), 2) Steel (St)**

All coiled pin-diameters

C ≥ 0,64	P ≤ 0,04
Mn ≥ 0,60	S ≤ 0,05
Si ≥ 0,15	Cr optional

Hardened and tempered to a hardness of 420–545 HV

**Austenitic stainless steel (A)**

C ≤ 0,15	Ni 6–12
Mn ≤ 2,00	P ≤ 0,045
Si ≤ 1,50	S ≤ 0,03
Cr 16–20	Mo ≤ 0,8

Cold-hardened



**Slotted pin ISO 8752**

**Material 1), 2) Steel (St)**

Steel at the option of the manufacturer: Either carbon steel with  
C ≥ 0,65%  
Mn ≥ 0,50%

**Austenitic stainless steel (A)**

C ≤ 0,15	Ni 6–12
Mn ≤ 2,00	P ≤ 0,045
Si ≤ 1,50	S ≤ 0,03
Cr 16–20	Mo ≤ 0,8

Hardened and tempered to a Vickers hardness of 420 – 520 HV or bairitized to a Vickers hardness of 500 – 560 HV

Cold-hardened



or

Silico-manganese steel with

C ≥ 0,5%
Si ≥ 1,5%
Mn ≥ 0,7%

Hardened and tempered to a Vickers hardness of 420 HV – 560 HV

1) The materials must correspond to the defined composition.

2) Other materials according to agreement (eg. CuZn or Cu).

THINKING IT THROUGH RIGHT FROM THE START

# KNOW-HOW FROM A COMPANY RENOWNED FOR GOOD QUALITY

QUALITY MANAGEMENT

WHETHER PLUG-TYPE CONNECTORS OR SPRING-TYPE  
DOWEL PINS – THE CONNECTIONS MADE IN OUR  
COMPANY, LAST FOR LIFE //--



We manufacture precision parts of wire and strip as well as laser welding products according to the specific requirements of our customers; we develop and realize tailor-made solutions for industrial scale manufacture.

Our especially qualified construction and technical production workers support you with all our experiences in metal forming and pressing technique at the realization of your ideas. That way, together with you, we will develop your special customer solution for a quality aware, cost-effective and environmentally friendly production.

#### Production quality control.

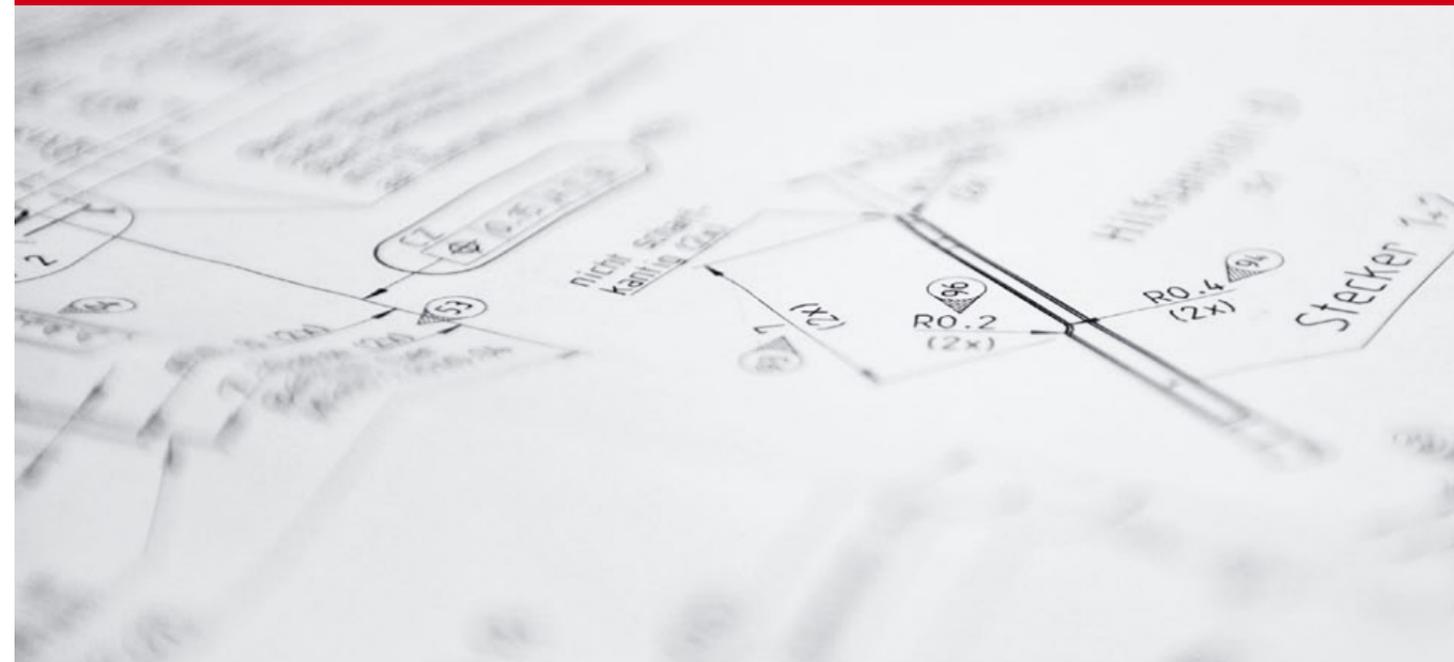
For many years now the use of integrated CAQ-systems has been part of our everyday life. Through that the traceability of finished products over surface refinement back to the ingoing material is guaranteed at any time. For the analysis and optimization of technical and quality relevant correlations we among others have been using methods as FMEA, SPC, APQP and PFU.

In order to apart from that get an idea of how good our administrative and operative processes work, we regularly check the customers as well as employees satisfaction. Besides the improvement approaches gained from that we have been practicing CIP (continuous improvement process), in order to utilize all knowledge potentials, which are able to further optimize our products and processes.



LET US THINK YOUR PROJECT THROUGH  
RIGHT FROM THE START.  
PLEASE CONTACT US.

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