Koenig Verbindungstechnik KVT

The World's Leading Sealing System

KOENIG expander®

2010

KOENIG expander®

Einzigartiges Verschliess- und Dichtsystem für Bohrungen

Der KOENIG-Expander® ist ein System,das mitabsoluterZuverlässigkeit Bohrungen verschiedenartiger Komponenten der Fluidtechnik verschliesst. Gegenüber Methoden - wie Verschlussschrauben mit Dichtscheiben und Dichtmittel, Einpressen von Stiften, Zuschweissen der Bohrungen etc. - zeichnet sich der KOENIG-Expander® durch schnelle, prozessüberwachte Montage sowie grosszügigen Fertigungstoleranzen des Bauteils aus. Dank dem ständig wachsenden Sortiment an Baureihen und der Möglichkeit, kundenspezifische Anfertigungen zu realisieren, bietet KVT für jede Anwendung ein geeignetes Verschliess-System an.

Unique sealing and tightening system for holes

The KOENIG-Expander® is a system to seal holes with absolute integrity in various components in Mobile Fluid Power Market. Compared to earlier methods, such as threaded plugs with or without sealing software, press-in pins, welding, etc. the KOENIG-Expander® distinguishes itself by its fast and reliable installation while incorporating reasonable installation tolerances. Thanks to the continuous expansion of our product offering along with the capability to custom design sealing components to customer specifications, KVT offers a suitable sealing system for every application.

KOENIG-Expander® ermöglichen ein sicheres und dichtes Verschliessen der Bohrungen und verfügen - auch bei extremer Druckbeanspruchung - über ausreichende Sicherheit. Deshalb hat dieses System sich ein breites Anwendungsfeld erschlossen: Steuer- und Regelventile, Anschluss- und Verteilplatten, Pumpen, Motorenkomponenten, Getriebe-Bremskomponenten etc.

The KOENIG-Expander® plug, as designed pressure ratings incorporate minimum Factor of Safety to accommodate for pressure spikes and cyclic pressure loading. As a result of this reliable and leak tight sealing system, the expanders have found broad application on components such as: hydraulic and pneumatic control valves and manifolds, hydraulic pumps and motors, power transmission components, brake components, etc.

KOENIG expander®

Automobilbau

- ABS Brems-Systeme
- Motor und Getriebe
- Lenksysteme
- Kraftstoff-Einspritzung

Automotive Industry

- *ABS Break-Systems*
- *Engine and power transmission*
- *Power steering*
- *Fuel injection systems*

Flugzeugbau

- Stellantriebe
- Fahrwerk
- Flugsimulatoren

Aircraft Industry

- *Control gear*
- *Landing gear*
- *Flight simulators*

Werkzeugmaschinen / Sondermaschinen

- Spannvorrichtung
- Kühl-Schmiersysteme
- Matrizen für Spritzgiessmaschinen

Machine tools /custom equipment

- *Clamping device*
- *Cooling and lubricating systems*
- *Molds for injection moulding machines*

Mobilhydraulik/ Fördertechnik

- Steuer-Antriebseinheiten
- Hebebühnen
- Baumaschinen

Mobile hydraulics/ material handling equipment

- *Control and drive units*
- *Lifts and platforms*
- *Construction equipment*

KOENIG expander

Serie MB

Die Expansion und Verankerung der Hülse mit der Bohrungswand erfolgt durch Einpressen der Kugel in die Hülsenbohrung. Die Serie MB eignet sich für den Einsatz in Grundwerkstoffen mit geringer bis hoher Härte.

MB Series

Expansion and anchorage of sleeve in hole wall is achieved by pressing the ball into sleeve. The MB Series plug is designed for use in base materials of both low to high hardness.

Series SK

Die Expansion der Hülse bewirkt ein Zug-Spreizelement mit konischer Partie. Mittels einem Spezialwerkzeug wird die dazu notwendige Axialkraft eingeleitet bis das Spreizelement an dervoraus bestimmten Stelle abbricht. Das Rillenprofil am Aussendurchmesser der Hülse hat insbesondere bei Leichtmetallen eine erzwungene Verankerung mit der Bohrungswand zur Folge.

SK Series

Pull/Expand principle. The installation tool maintains sleeve position in the hole while pulling the mandrel into, and expanding the sleeve until the mandrel breaks off at a predetermined point. Anchorage is achieved by the serrations on the outside of the sleeve anchoring into the base material especially in soft material.

Serie HK

Die Konzeption der Serie HK basiert ebenfalls auf dem Zug-/ Spreizprinzip. Dank der weichen Hülse wird eine Verankerung über das Rauheitsprofil der Bohrung ermöglicht. Die Serie HK eignet sich besonders für den Einsatz in harten Einbauwerkstoffen.

HK Series

The installation is also based on the Pull/Expand principle. Thanks to the soft sleeve material, anchorage is achieved by the flow of sleeve material into the surface roughness of the drilled hole. The HK Series plug is especially suitable for the use in hard materials.

KOENIG expander®

Serie LK

DerDichtstopfenderSerieLKistfürAnwendungenimNiederdruckbereich bestimmt. Die Verarbeitungs- und Verankerungskonzeption entspricht jenerder Serie SK.

LK Series

This plug has been designed for applications in the low pressure range. It has an anchorage principle similar to the SK Series plugs.

Serie LP

Der Niederdruck-Dichtstopfen der Serie LP wird in eine konische Bohrung eingepresst. Der oberflächengehärtete, jedoch flexible Dichtstopfen verspannt sich mit der Bohrungswand; die labyrinthförmige Aussenverzahnung verkrallt sich mit der Bohrungswand oder Bohrungsrauheit.

LP Series

The low pressure-sealing plug is installed by pressing the plug into a tapered hole. The surface hardened, but flexible plug achieves anchorage by gripping with the hole wall.

KOENIG expander®

Wo kein Weg ist, schaffen wir einen

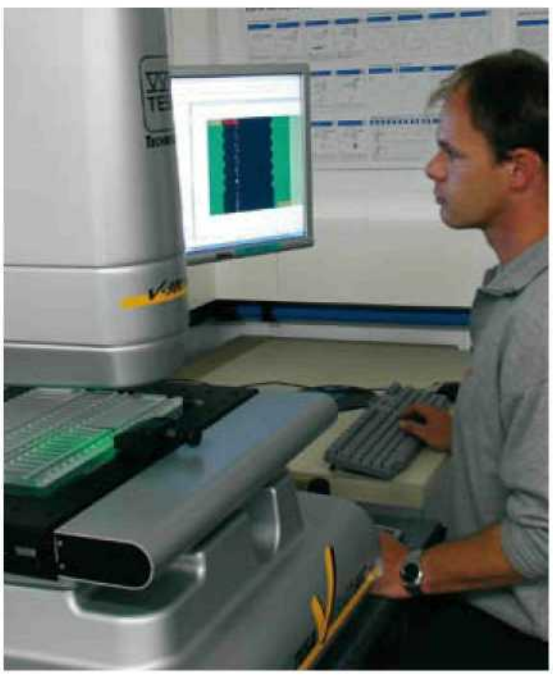
Ein ausgewiesenes Entwicklungsteam mit modernster technischer Infrastruktur steht Ihnen jederzeit zur Verfügung. Sei es durch kundenspezif ische Untersuchungen sowie Weiter- und Neuentwicklungen des KOENIG-Expanders: Sie finden bei uns stets die optimale Lösung.

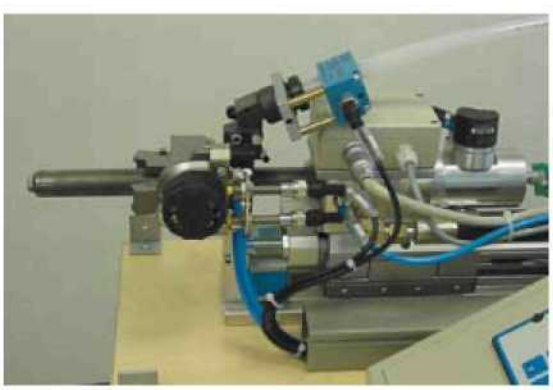
Zusammen mit Spezialisten in der Automationstechnik können auch Sie unsere Dienste als Systemanbieter in Anspruch nehmen. Wir helfen Ihnen bei der Evaluation komplexer prozessfähiger Montageautomaten.

If a solution is required, we'll provide one

A proven development team with the most modern technological infrastructure is available to you at any time. Whether through customer-specific tests, new developments or additional enhancements to the KOENIG-Expander®, you can depend on us to find the best solution.

Together with specialists in the field of automotive engineering, you can benefit from our services as a system supplier. We will help you to evaluate complex, process-capable automated assembly systems.





KOENIG expander®

Safety first, bis ins kleinste Detail

Unsere Qualitätspolitik ist nicht nur eine Philosophie, sondern ein Denken und Handeln aller Mitarbeiter im Dienste unserer Kunden. Als Inhaber des Qualitätszertifikates nach ISO/TS 16949 sowie des Umweltzertifikates nach ISO 14001, ist unsere oberste Prämisse die Sicherstellung der hohen Anforderungen an Produkte, Systeme und Dinstleistungen in Bezug auf:

- **Eignung**
- **Leistung und Sicherheit**
- **Zuverlässigkeit**
- **Umwelt**

Safety first, down to the smallest detail

Our quality policy is not merely a philosophy: it is the way our employees think and act to best serve our customers. As a holder of the ISO/TS 16949 quality certificate as well as the ISO 14001 environmental certificate, our top priority is to meet the high demands placed on products, systems and services as they relate to:

- ***Suitability***
- ***Service and safety***
- ***Reliability***
- ***Environment***

KOENIG expander®

KVT Produktepalette

Die KVT-Gruppe gilt international als kompetenter Partner in der Verbindungstechnik. Dank einem breiten Sortiment an mechanischen Befestigern, klebetechnischen Produkten und Verschlüssen bieten wir unseren Partnern optimale Anwendungslösungen an. Unsere Kunden sollen von unserem Know How und unseren Dienstleistungen profitieren:

- Ausgewiesene Spezialisten als Kundenberater im Innen- und Aussendienst
- Modernes Informations- und Demonstrationszentrum, Fachtagungen, Schulungen
- Verschiedene chemische und mechanische Labors
- Konstruktion kundenspezifischer Verbindungsteile
- Ausführliche Dokumentationen
- EffizienterWerkzeug- und Maschinenservice, grosses Ersatzteillager
- Umfangreiches Sortiment mit grosser Lieferbereitschaft
- **Zertifiziert** in Qualitäts- und Umweltmanagement (ISO 9001/ISO 14001)
- ISO/TS 16949 für KOENIG-Expander

Product Arrangement

The KVT group is known world-wide as a partner in the Fastener Industry. Thanks to the large range of mechanical fasteners, adhesive products, and latches, we can offer to our customers' optimum solutions to their applications. Our customer will profit from our know-how and our services:

- *Inside and outside, accredited customer service consultants.*
- *In-house Product Information and Training Center that offers seminars, courses and demonstrations.*
- *Facilities both chemical and mechanical testing*
- *Ability to design special fasteners to customer specifications.*
- *Efficient tool and machining service with a large inventory of spare parts*
- *Large selection of stock with excellent lead times*
- *Certified Quality and Environment Management System (ISO 9001 /ISO 14001)*
- *ISO/TS 1 6949 for KOENIG-Expander sealing plugs*

KVT, 8953 Dietikon • T 044.743.33.33 • F 044.740.65.66 • www.kvt-koenig.com

KOENIG expander®

Dichtstopfen
Sealing Plugs

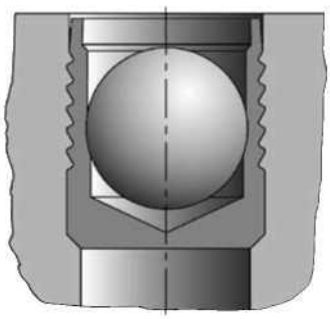
KOENIG
expander®

NOTIZEN / *NOTES*

KOENIG expander®

SerieMB

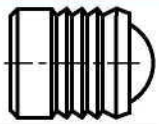
MB Series



- Grosses Lieferangebot von ø 3 bis 22 mm, auch als Inch-Ausführung
- Korrosionsbeständige Ausführung
- Einfache schnelle Montage
- Rein mechanische Abdichtung durch Zwangsverkrallung
- Betriebsdruckleistungen bis 450 bar
- Geeignet für vollautomatische Verarbeitung

- *Large range of sizes, ø 3 to 22 mm, also available in inch version*
- *Corrosion resistant execution*
- *Fast and easy installation*
- *Pure mechanical sealing by forced anchorage*
- *Rated pressure performances up to 450 bar*
- *Suitable for automated installation*

KOENIG expander®



Dichtstopfen MB

Sealing Plugs MB

MB 600

MB 600

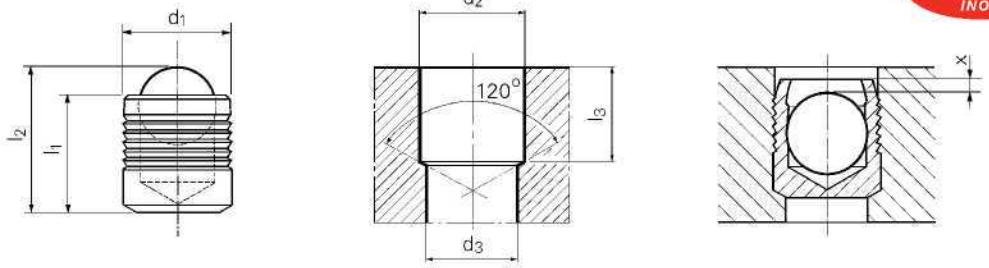
Hiilse: Nichtrostender Stahl 1.4305
Kugel: Nichtrostender Stahl 1.4301

Sleeve: Stainless Steel DIN 1.4305
Ball: Stainless Steel DIN 1.4301

Hülse und Kugel farblos passiviert, MIL S 5002 Luftfahrt-Qualität

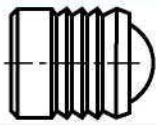
Sleeve and Ball clear passivated per MIL S 5002 Aerospace Quality

ROSTFREI INOX



d_1 Expander ⌀	l_1	l_2 ~	d_2 + 0,1 0	d_3 max.	l_3 min.	x ±0,2	Type		+ IP
3,0	3,6	4,6	3,0	2,2	3,4	0,4	MB 600-030	100	1000
4,0	4,0	5,2	4,0	3,3	3,8	0,2	MB 600-040	100	1000
5,0	5,5	7,1	5,0	4,3	5,3	0,4	MB 600-050	100	1000
6,0	6,5	8,6	6,0	5,3	6,3	0,4	MB 600-060	100	500
7,0	7,5	10,1	7,0	6,4	7,3	0,4	MB 600-070	100	250
8,0	8,5	11,6	8,0	7,4	8,3	0,3	MB 600-080	50	250
9,0	10,0	13,5	9,0	8,4	9,8	0,4	MB 600-090	50	250
10,0	11,0	15,1	10,0	9,4	10,8	0,4	MB 600-100	50	250
12,0	13,0	17,8	12,0	10,6	12,8	0,4	MB 600-120	25	100
14,0	15,0	20,5	14,0	12,7	14,5	0,4	MB 600-140	25	100

KOENIG expander®



Dichtstopfen MB

MB 600, Zollausfiihrung

Hiilse: Nichtrostender Stahl 1.4305
Kugel: Nichtrostender Stahl 1.4034 (MB 600-093)
1.4301

Hülse und Kugel farblos passiviert, MIL S 5002
Luftfahrt-Qualität

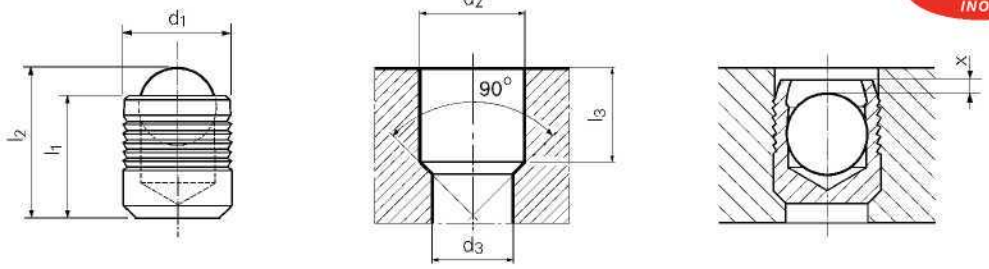
Sealing Plugs MB

MB 600, Inch-Version

Sleeve: Stainless Steel DIN 1.4305
Ball: Stainless Steel DIN 1.4034 (MB600-093)
DIN 1.4301

Sleeve and Ball clear passivated per MIL S 5002
Aerospace Quality

ROSTFREI INOX



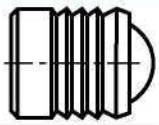
Toleranzen /*Tolerances* d_2 : MB 600-093A = $^{+}g^{002}$
MB 600-125A bis/to MB 600-281A = ' §^{004}

d_1 Expander ⌀	l_1	l_2 ~	d_2 Tol.	d_3 max.	l_3 min.	x 0 -0,012	Type		+ IP
0,093	0,100	0,120	0,0937	0,062	0,095	0,012	MB 600-093A	100	1000
0,125	0,138	0,170	0,1250	0,093	0,125	0,012	MB 600-125A	100	1000
0,156	0,150	0,195	0,1562	0,125	0,130	0,012	MB 600-156A	100	1000
0,187	0,193	0,260	0,1875	0,156	0,152	0,012	MB 600-187A	100	500
0,218	0,225	0,300	0,2187	0,187	0,187	0,012	MB 600-218A	100	500
0,250	0,260	0,350	0,2500	0,218	0,212	0,012	MB 600-250A	100	500
0,281	0,285	0,380	0,2812	0,250	0,250	0,012	MB 600-281A	100	500

Masse in Inch

Dimensions in Inches

KOENIG expander®



Dichtstopfen MB

Sealing Plugs MB

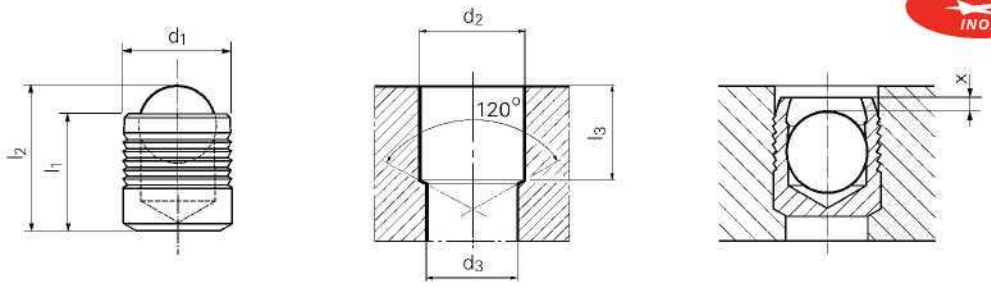
MB 700

MB 700

Hiilse: Nichtrostender Stahl 1.4305, blank
Kugel: Wälzlager-Stahl, vergiitet angelassen

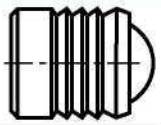
Sleeve: Stainless Steel DIN 1.4305, plain finish
Ball: Bearing Steel, Heat treated

ROSTFREI INOX



d_1 Expander ⌀	l_1	l_2 ~	d_2 + 0,1 0	d_3 max.	l_3 min.	x ±0,2	Type		+ IP
3,0	3,6	4,6	3,0	2,2	3,4	0,4	MB 700-030	100	1000
4,0	4,0	5,2	4,0	3,3	3,8	0,2	MB 700-040	100	2000
5,0	5,5	7,1	5,0	4,3	5,3	0,4	MB 700-050	100	2000
6,0	6,5	8,6	6,0	5,3	6,3	0,4	MB 700-060	100	2000
7,0	7,5	10,1	7,0	6,4	7,3	0,4	MB 700-070	100	1000
8,0	8,5	11,6	8,0	7,4	8,3	0,3	MB 700-080	50	1000
9,0	10,0	13,5	9,0	8,4	9,8	0,4	MB 700-090	50	500
10,0	11,0	15,1	10,0	9,4	10,8	0,4	MB 700-100	50	500
12,0	13,0	17,8	12,0	10,6	12,8	0,4	MB 700-120	50	250
14,0	15,0	20,5	14,0	12,7	14,5	0,4	MB 700-140	50	250
16,0	17,0	23,4	16,0	14,7	16,5	0,6	MB 700-160	25	100
18,0	19,0	26,3	18,0	16,7	18,5	0,6	MB 700-180	25	100
20,0	22,0	30,0	20,0	18,7	21,5	0,8	MB 700-200	25	100
22,0	25,0	34,0	22,0	20,7	24,5	0,8	MB 700-220	25	50

KOENIG expander®



Dichtstopfen MB

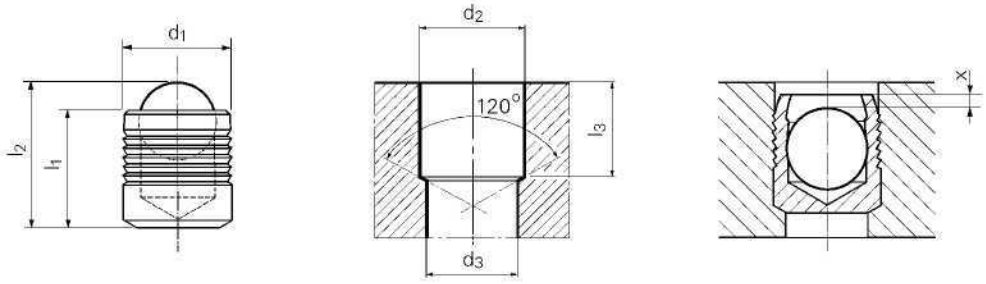
Sealing Plugs MB

MB 850

MB 850

Hiilse: Einsatzstahl
verzinkt, dickschichtpassiviert, Cr (VI)-frei
Kugel: Wälzlager-Stahl, vergiitet angelassen

Sleeve: Case Hardening Steel
Zinc plated, thick coat passivated, CR (VI)-free
Ball: Bearing Steel, Heat treated



d_1 Expander ⌀	l_1	l_2 ~	d_2 + 0,1 0	d_3 max.	l_3 min.	x ±0,2	Type		+ IP
3,0	3,6	4,6	3,0	2,2	3,4	0,4	MB 850-030	100	1000
4,0	4,0	5,2	4,0	3,3	3,8	0,2	MB 850-040	100	2000
5,0	5,5	7,1	5,0	4,3	5,3	0,4	MB 850-050	100	2000
6,0	6,5	8,6	6,0	5,3	6,3	0,4	MB 850-060	100	2000
7,0	7,5	10,1	7,0	6,4	7,3	0,4	MB 850-070	100	1000
8,0	8,5	11,6	8,0	7,4	8,3	0,3	MB 850-080	50	1000
9,0	10,0	13,6	9,0	8,4	9,8	0,4	MB 850-090	50	500
10,0	11,0	15,1	10,0	9,4	10,8	0,4	MB 850-100	50	500
12,0	13,0	17,8	12,0	10,6	12,8	0,4	MB 850-120	50	250
14,0	15,0	20,5	14,0	12,7	14,5	0,4	MB 850-140	50	250
16,0	17,0	23,4	16,0	14,7	16,5	0,6	MB 850-160	25	100
18,0	19,0	26,3	18,0	16,7	18,5	0,6	MB 850-180	25	100
20,0	22,0	30,0	20,0	18,7	21,5	0,8	MB 850-200	25	100
22,0	25,0	34,0	22,0	20,7	24,5	0,8	MB 850-220	25	50

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge MB, mechanisch

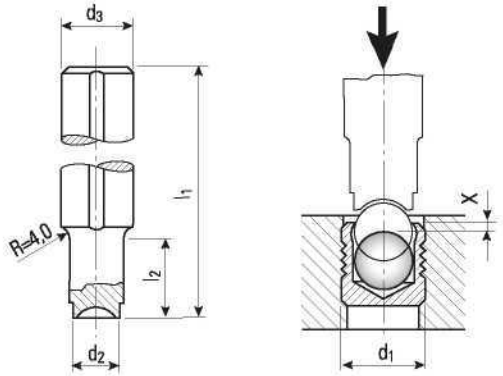
Setting Tools - MB Series, mechanical

Setzstempel

Setting Tool

Werkzeugstahl vergütet, Härte ca. HRC 50

Tool steel. Heat treated, hardness approx. HRC 50

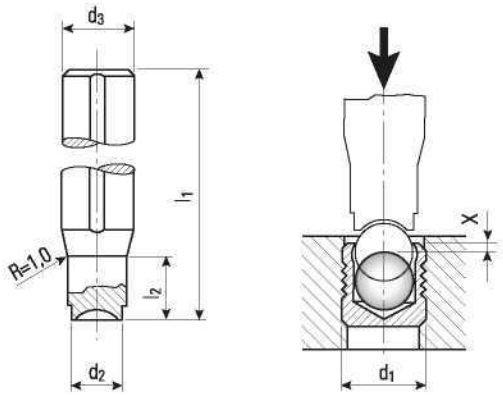


d_1 Expander ∅	d_3 - h9	l_1	d_2	l_2	x ± 0,2	Type
3,0	10	100	2,8	10	0,4	MB 030
4,0	10	100	3,8	10	0,2	MB 040
5,0	10	100	4,8	12	0,4	MB 050
6,0	10	100	5,8	15	0,4	MB 060
7,0	10	100	6,8	18	0,4	MB 070
8,0	10	100	7,8	20	0,3	MB 080
9,0	14	100	8,8	22	0,4	MB 090
10,0	14	100	9,8	25	0,4	MB 100
12,0	14	150	11,7	30	0,4	MB 120
14,0	20	150	13,7	35	0,4	MB 140
16,0	20	150	15,7	40	0,6	MB 160
18,0	20	150	17,7	45	0,6	MB 180
20,0	25	150	19,7	50	0,8	MB 200
22,0	25	150	21,7	55	0,8	MB 220

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge MB, mechanisch	*Setting Tools - MB Series, mechanical*
Setzstempel, Zollausfiihrung	*Setting Tool, Inch-Version*
Werkzeugstahl vergiitet, Härte ca. HRC 50	***Tool steel. Heat treated, hardness approx. HRC 50***



d_1 Expander ⌀	d_3 - h9	l_1	d_2	l_2	x 0 -0,012	Type
0,093	0,394	3,94	0,082	0,137	0,012	MB 093A
0,125	0,394	3,94	0,117	0,137	0,012	MB 125A
0,156	0,394	3,94	0,148	0,137	0,012	MB 156A
0,187	0,394	3,94	0,180	0,137	0,012	MB 187A
0,218	0,394	3,94	0,211	0,400	0,012	MB 218A
0,250	0,394	3,94	0,242	0,400	0,012	MB 250A
0,281	0,394	3,94	0,273	0,400	0,012	MB 281A

Masse in Inch *Dimensions in Inches*

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge MB, hydro-pneumatisch

Tischpresse ExPress 3000

Mit Kraft - Wegiiberwachung

Setting Tools MB, hydropneumatic

Table Press ExPress 3000

Force and distance controlled

C€

Type ExPress 3000

Hydropneumatische Montageeinrichtung für die Montage von KOENIG-Expander der Serien MB und LPvon 0 3-10 mm. Ein schneller Werkzeugwechsel erspart lange Umrüstzeiten. Der notwendige Arbeitshub istvorprogrammiert und nach zu verarbeitendem Expander-Typ abrufbar (max. 32 Speicherplätze). Ausserdem wird der Arbeitshub bei jedem einzelnen Expander neu referenziert, was eine hohe Prozesssicherheit und Verarbeitungsqualität garantiert. Die Presse verfügt über eine Kraft-Weg-Überwachung; entsprechende Daten lassen sich zur späteren Verarbeitung auf einem kundenseitigen Computer mittels RS232 Schnittstelle aufzeichnen. Die dazu notwendige Software ist im Lieferumfang enthalten.

Hydropneumatic assembly unit for the installation of KOENIG-Expander series MB and LP from 0 3-10 mm. The fast tool change avoids long changeover times. The needed working stroke is pre-programmed and available according to the required type of Expander (max. 32 memory positions). The working stroke is referenced at each single Expander, what guarantees a continuous process quality. The press provides a force-way-survey; corresponding data can be recorded on a customer sided computer with a RS232 interface for a later processing. The needed software is included in the scope of delivery.

Technische Daten:		***Technical Data:***	
Höhe	ca. 1360 mm	*Height*	*approx. 1360 mm*
Breite	ca. 340 mm (max. 530 mm)	*Width*	*approx. 340 mm (max. 530 mm)*
Tiefe	ca. 495 mm	*Depth*	*approx. 495 mm*
Arbeitsraum	250 x 200 mm	*Working Space*	*250 x 200 mm*
Presskraft	ca. 30 kN	*Pressing Force*	*approx. 30 kN*
Pinolenhub	60 mm, (Arbeitshub 10 mm)	*Cylinder Ram*	*60 mm, (Working Stroke 10 mm)*
Gewicht	ca. 140 kg	*Weight*	*approx. 140 kg*

Weitere Ausführung: **Typ ExPress 5000**

Tischpresse für die Montage von KOENIG-Expander der Serien MB und LP von 012-22 mm (03-22 mm auf Anfrage)

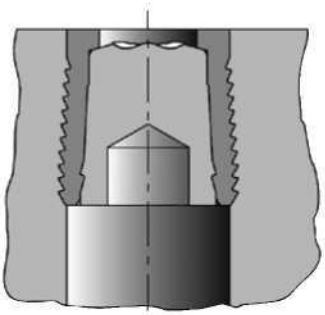
Another Type: ***ExPress 5000***

Table press for the installation of KOENIG-Expander series MB and LP from 0 12-22 mm (0 3-22 mm on request)

KOENIG expander®

Serie SK

SK Series



- Ausführung zum vertieften Setzen
- Sehr schnelle Montage mittels handlichen Werkzeugen
- Direkteinbau in Nennbohrung (Systembohrung)
- Grosszügige Bohrungstoleranz
- Geringe Einbaulänge
- Betriebsdruckleistungen bis 500 bar
- Keine Axialbelastung des Bauteils

- *Expanders for recessed setting*
- *Very fast installation by means of handy tools*
- *Installs directly into drilled hole, no additional machining required*
- *Large drilled hole tolerance*
- *Short installation length*
- *Rated pressure performances up to 500 bar*
- *No axial loading imposed on component*

KOENIG expander®

Dichtstopfen SK

SK 550 / Standard

Hiilse: Einsatzstahl, gebläut

Stiff: Vergiitungsstahl
Spez. Oelfilm

Hülse und Stift vormontiert
Geeignet für automatisierte Verarbeitung

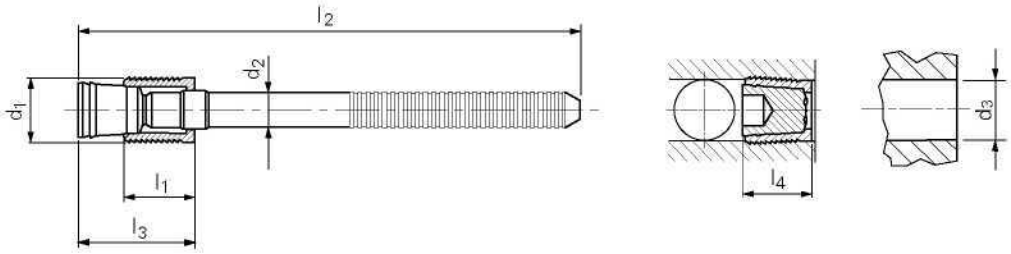
Sealing Plugs SK

SK 550 / Standard

Sleeve: Case Hardening Steel
Gun metal-finish

Mandrel: Heat treatable steel
Special oil film lubrication

One piece construction
Ideal for automated high production requirements



d_1 Expander ⌀	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 +0,12 0	Type		+ IP
4,0	4,5	2,50	39	9,0	6,5	4,0	SK550-040	100	1000
5,0	5,5	3,00	41	10,0	7,5	5,0	SK550-050	100	1000
6,0	6,5	3,40	43	12,0	8,0	6,0	SK550-060	100	500
7,0	7,5	4,10	38	14,0	9,0	7,0	SK550-070	100	500
8,0	8,5	4,20	40	15,0	10,5	8,0	SK550-080	100	500
9,0	9,5	4,50	43	17,0	11,0	9,0	SK550-090	100	250
10,0	10,5	4,75	45	19,0	12,5	10,0	SK550-100	100	250

KOENIG expander®

Dichtstopfen SK

SK 552 / Stift lang

Hiilse: Einsatzstahl, gebläut

Stift: Vergiitungsstahl
Spez. Oelfilm

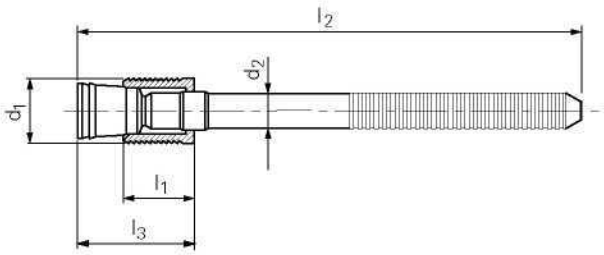
Hülse und Stift vormontiert
Geeignet für automatisierte Verarbeitung
Sonder-Typ: Stift 30 mm verlängert

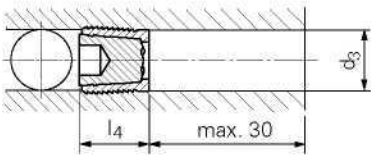
Sealing Plugs SK

SK 552 / Long Mandrel

Sleeve: Case Hardening Steel
Gun metal-finish
Mandrel: Heat treatable steel
Special oil film lubrication

One piece construction
Ideal for automated high production requirements
Special Type: Mandrel 30 mm longer





d_1 Expander ⌀	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 +0,12 0	Type		+ IP
4,0	4,5	2,50	69	9,0	6,5	4,0	SK552-040	100	1000
5,0	5,5	3,00	71	10,0	7,5	5,0	SK552-050	100	500
6,0	6,5	3,40	73	12,0	8,0	6,0	SK552-060	100	500
7,0	7,5	4,10	68	14,0	9,0	7,0	SK552-070	100	250
8,0	8,5	4,20	70	15,0	10,5	8,0	SK552-080	100	250
9,0	9,5	4,50	73	17,0	11,0	9,0	SK552-090	50	100
10,0	10,5	4,75	75	19,0	12,5	10,0	SK552-100	50	100

KOENIG expander®

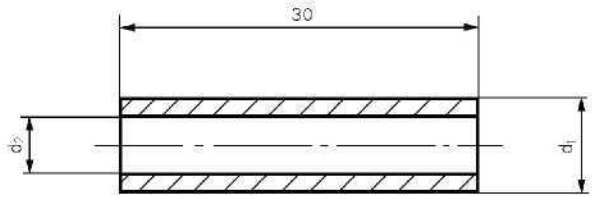
WERKZEUGE TOOLS

Setzwerkzeuge SK552 / *Setting Tools SK552*

Distanzhiilsen / *Spacers*

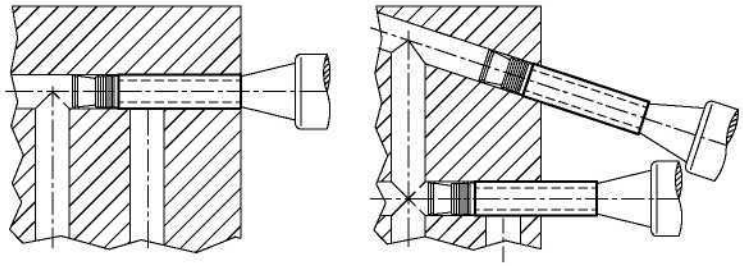
Zum Versetzen von KOENIG-Expander Serie SK mit 30 mm verlängertem Stift

For setting KOENIG-Expander SK plugs with 30 mm longer mandrels



d_1	d_2	Type	Serie SK *Series SK*
4,0	2,7	4X30-SK	SK 552-040
5,0	3,2	5X30-SK	SK 552-050
6,0	3,7	6X30-SK	SK 552-060
7,0	4,6	7X30-SK	SK 552-070
8,0	4,8	8X30-SK	SK 552-080
9,0	5,2	9X30-SK	SK 552-090
10,0	5,6	10X30-SK	SK 552-100

Anwendungsbeispiele / *Typical Applications*



KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge SK, mechanisch

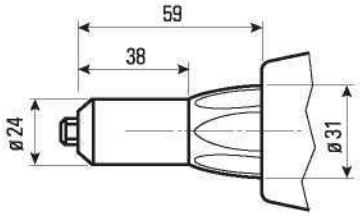
Setting Tools SK, mechanical

Hebelschere

Hand Lever Tool SK

Inkl. Mundstiicke

Nocepieces included



Type KW-008

Technische Daten:		***Technical Data:***	
Gewicht	1,95 kg	*Weight*	*1,95 kg*
Werkzeuglänge	515 mm	*Length*	*515 mm*

Ausrüstung

Equipment

Expander ⌀	Mundstück *Nosepiece* Type
4,0	DPM400-C10
5,0	DPM400-D10
6,0	DPM400-E10

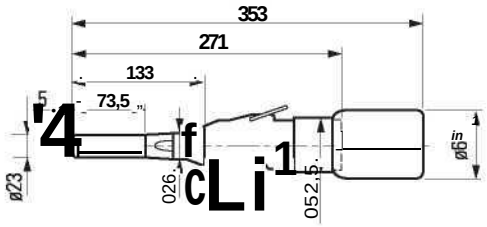
Expander ⌀	Klemmbacken *Jaws* Type
4,0 - 6,0	PRG 540-46E

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge SK	*Setting Tools SK*
hydro-pneumatisch	*Hydraulic / Pneumatic Tool*
Mit Nagelabsaugvorrichtung	*With mandrel collection device*
Ohne Ausriistung	***Without Equipment***

CE



Type ExTool-030

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,5 kg	*Weight*	*2,5 kg*

Ausrüstung / Equipment

Expander ⌀	Mundstück *Nosepiece*
	Typ
4,0	361013304100
5,0	361013305100
6,0	361013306100

Ersatzteile / *Spare parts*

Expander ⌀	Klemmbacken *Jaws*
	Type
4,0 - 6,0	361130400504

Expander ⌀	Klemmbackengehäuse *Jaw case*
	Type
4,0 - 6,0	321020000012

Expander ⌀	Stössel *Jaw pusher*
	Type
4,0 - 6,0	361013304010

KOENIG expander®

WERKZEUGE TOOLS

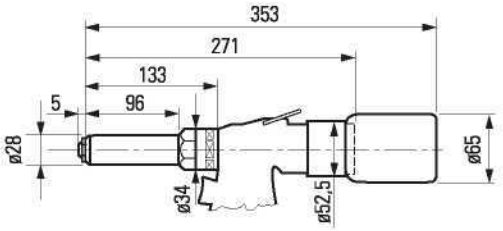
Setzwerkzeuge SK / *Setting Tools SK*

hydro-pneumatisch / *Hydraulic / Pneumatic Tool*

Mit Nagelabsaugvorrichtung / *With mandrel collection device*

Ohne Ausriistung / ***Without Equipment***

CE



Type ExTool-040-1

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,7 kg	*Weight*	*2,7 kg*

Ausriistung / *Equipment*

Expander ø	Mundstück *Nocepiece*
	Typ
7,0	361013307100
8,0	361013308100
9,0	361013309100
10,0	361013310100

Ersatzteile / *Spare parts*

Expander ø	Klemmbacken *Jaws*
	Typ
7,0 - 10,0	361130400507-3-1

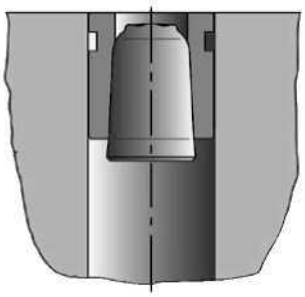
Expander ø	Klemmbackengehäuse *Jaw case*
	Typ
7,0 - 10,0	361059120013

Expander ø	Stössel *Jaw pusher*
	Type
7,0 - 10,0	361013307010

KOENIG expander®

Serie HK

HK Series



- Lieferangebot von ø 3 bis 10 mm
- Ausführung zum vertieften Setzen
- Sehr schnelle Montage mittels handlichen Werkzeugen
- Direkteinbau in Nennbohrung (Systembohrung)
- Grosszügige Bohrungstoleranz
- Betriebsdruckleistungen bis 350 bar
- Keine Axialbelastung des Bauteils

- *Large range of sizes, ø 3 to 10 mm*
- *Expanders for recessed setting*
- *Very fast installation by means of handy tools*
- *Installs directly into drilled hole, no additional machining required*
- *Large drilled hole tolerance*
- *Rated pressure performances up to 350 bar*
- *No axial loading imposed on component*

KOENIG expander®

Dichtstopfen HK

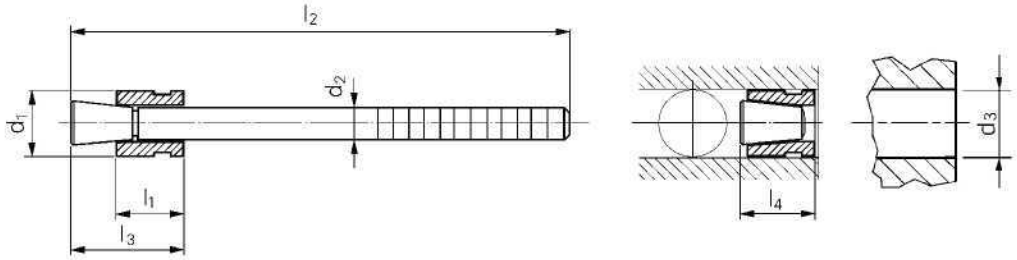
HK 55 / Standard

Hiilse: Einsatzstahl, weichgegliiht, gebläut
Stiff: Vergiitungsstahl
Spez. Ölfilm

Sealing Plugs HK

HK 55 / Standard

Sleeve: Case Hardening Steel
Soft annealed gun metal finish
Mandrel: Heat treatable Steel
Special oil film lubrication



d_1 Expander ⌀	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 + 0,1 0	Type	
3,0	5,0	2,0	36,5	9,0	7,0	3,0	HK030-CK55-111	100
4,0	5,0	2,2	38,0	9,5	8,0	4,0	HK040CK55-111AK	100
5,0	6,0	2,8	43,0	11,0	9,5	5,0	HK050CK55-111AK	100
6,0	6,5	2,8	43,0	12,0	10,0	6,0	HK060CK55-111AK	100
7,0	7,5	3,8	43,0	13,0	11,0	7,0	HK070CK55-111AK	100
8,0	8,5	4,5	38,0	13,5	11,5	8,0	HK080CK55-111AK	100
9,0	9,5	4,5	41,0	14,5	13,0	9,0	HK090CK55-111AK	100
10,0	10,5	4,5	41,0	15,5	13,5	10,0	HK100CK55-111AK	100

d, 03: Hülse und Stift nicht vormontiert.

Für Neuanwendungen Serie SK verwenden.

rfj *03: Sleeve and mandrel not pre-assembled*

Use Series SK for new application

KVT, 8953 Dietikon • T.044.743.33.33 • F.044.740.65.66 • www.kvt-koenig.com

KOENIG expander®

Dichtstopfen HK

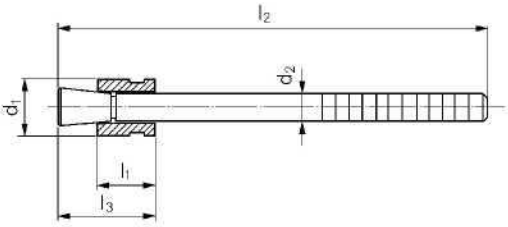
HK 55 / Stift lang

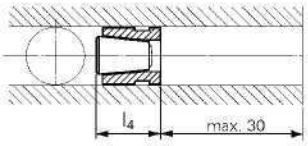
Hiilse: Einsatzstahl, weichgegliiht, gebläut
Stift: Vergiitungsstahl
Spez. Ölfilm
Sonder-Typ: Stift 30 mm verlängert

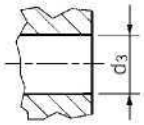
Sealing Plugs HK

HK 55 / Long Mandrel

Sleeve: Case Hardening Steel
Soft annealed gun metal finish
Mandrel: Heat treatable Steel
Special oil film lubrication
Special Type: Mandrel 30 mm longer







d_1 Expander ⌀	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 + 0,1 0	Type	
4,0	5,0	2,2	68,0	9,5	8,0	4,0	HK040CK55-211AK	100
5,0	6,0	2,8	73,0	11,0	9,5	5,0	HK050CK55-211AK	100
6,0	6,5	2,8	73,0	12,0	10,0	6,0	HK060CK55-211AK	100
7,0	7,5	3,8	73,0	13,0	11,0	7,0	HK070CK55-211AK	100
8,0	8,5	4,5	68,0	13,5	11,5	8,0	HK080CK55-211AK	100
9,0	9,5	4,5	71,0	14,5	13,0	9,0	HK090CK55-211AK	50
10,0	10,5	4,5	71,0	15,5	13,5	10,0	HK100CK55-211AK	50

Für Neuanwendungen Serie SK verwenden.

Use Series SK for new application

KOENIG expander®

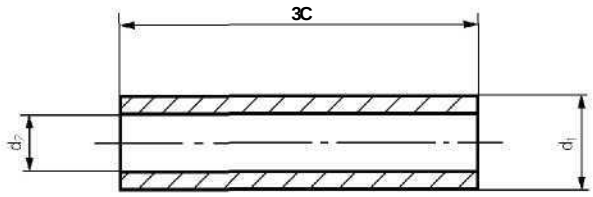
WERKZEUGE TOOLS

Setzwerkzeuge HK — *Setting Tools - HK Series*

Distanzhiilsen — *Spacers*

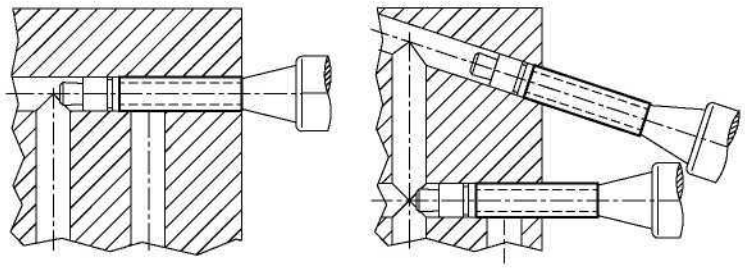
Zum Versetzen von KOENIG-Expander Serie HK mit 30 mm verlängertem Stift

For setting KOENIG-Expander HK plugs with 30 mm longer mandrels



d_1	d_2	Type	Serie HK *Series HK*
4,0	2,4	4X30 HK	HK040-CK55-211 AK
5,0	3,0	5X30 HK	HK050-CK55-211 AK
6,0	3,0	6X30 HK	HK060-CK55-211 AK
7,0	4,1	7X30 HK	HK070-CK55-211 AK
8,0	4,8	8X30 HK	HK080-CK55-211 AK
9,0	4,8	9X30 HK	HK090-CK55-211 AK
10,0	6,3	10X30 HK	HK100-CK55-211 AK

Anwendungsbeispiele / *Typical Applications*



KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge HK, mechanisch

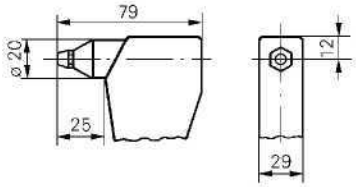
Setting Tools HK, mechanical

Handzange HK

Inkl. Ausrüstung

Hand Plier HK

Equipment included



Type KW-002

Ausrüstung

Equipment

Expander ø	Mundstück *Nosepiece* Type
3,0	HKW-002103
4,0	HKW-002104

Expander ø	Klemmbacken *Jaws* Type
3,0 - 4,0	15068

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge HK, mechanisch

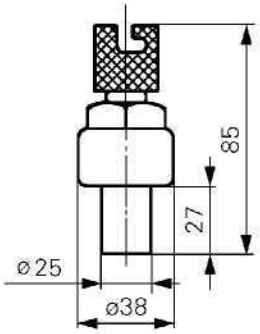
Setting Tools HK, mechanical

Handsetzwerkzeug HK 55

Handsetting Tool HK 55

Ohne Rätschenschliissel
fiir 08,0/9,0/10,0

Without ratchet
for 08,0/9,0/10,0



Type KW-003

Rätschenschlüssel

Ratchet Spanner Wrench

Zu HK 55

For HK 55

Type HKW-003908

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge HK, mechanisch

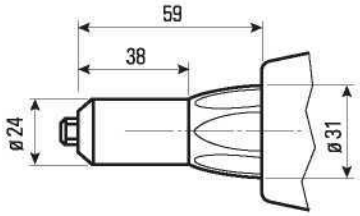
Setting Tools HK, mechanical

Hebelschere

Hand Lever Tool HK

Inkl. Mundstücke

Nosepieces included



Type KW-008

Technische Daten:		***Technical Data:***	
Gewicht	1,95 kg	*Weight*	*1,95 kg*
Werkzeuglänge	515 mm	*Length*	*515 mm*

Ausrüstung

Equipment

Expander ⌀	Mundstück *Nosepiece* Type
3,0 / 4,0	DPM400-B10
5,0 / 6,0	DPM400-C10

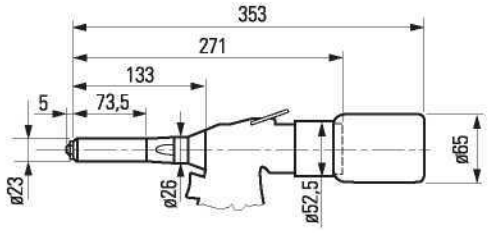
Expander ⌀	Klemmbacken *Jaws* Type
3,0 - 6,0	PRG 540-46E

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge HK	*Setting Tools HK*
hydro-pneumatisch	*Hydraulic / Pneumatic Tool*
Mit Nagelabsaugvorrichtung	*With mandrel collection device*
Ohne Ausriistung	***Without Equipment***

CE



Type ExTool-030

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,5 kg	*Weight*	*2,5 kg*

Ausrüstung / *Equipment*

Expander ⌀	Mundstück *Nosepiece*
	Typ
3,0	361013303110
4,0	361013304110
5,0	361013305110
6,0	361013306110

Ersatzteile / *Spare parts*

Expander ⌀	Klemmbacken *Jaws*
	Type
3,0 - 6,0	361130400504

Expander ⌀	Klemmbackengehäuse *Jaw case*
	Type
3,0 - 6,0	321020000012

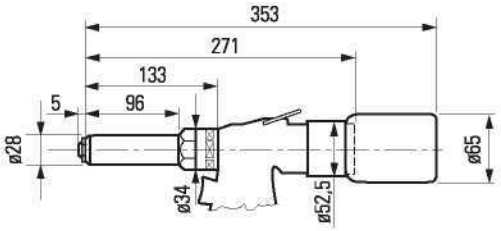
Expander ⌀	Stössel *Jaw pusher*
	Type
3,0 - 6,0	361013304010

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge HK	*Setting Tools HK*
hydro-pneumatisch	*Hydraulic / Pneumatic Tool*
Mit Nagelabsaugvorrichtung	*With mandrel collection device*
Ohne Ausriistung	***Without Equipment***

CE



Type ExTool-040-1

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,7 kg	*Weight*	*2,7 kg*

Ausrüstung / *Equipment*

Expander ø	Mundstück *Nocepiece* Typ
7,0	361013307110
8,0	361013308110
9,0	361013309110
10,0	361013310110

Ersatzteile / *Spare parts*

Expander ø	Klemmbacken *Jaws* Typ
7,0 - 10,0	361130400507-3-1

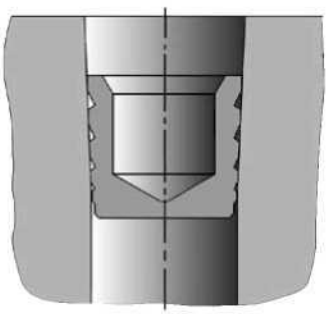
Expander ø	Klemmbackengehäuse *Jaw case* Typ
7,0 - 10,0	361059120013

Expander ø	Stössel *Jaw pusher* Typ
7,0 - 10,0	361013307010

KOENIG expander®

Serie LP

LP Series



- Mechanische Labyrinth-Abdichtung
- Guter Korrosionsschutz
- Geeignet für vollautomatische Verarbeitung
- Betriebsdruckleistungen bis 60 bar

- *Mechanical labyrinth sealing*
- *Satisfactory corrosion protection*
- *Rated pressure performances up to 60 bar*
- *Suitable for fully automated installation*

KOENIG expander®

Dichtstopfen LP

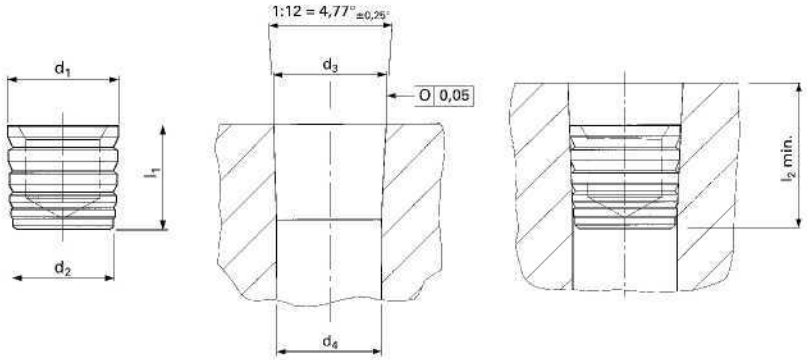
Sealing Plugs LP

LP900

LP900

Werkstoff: Automatenstahl
Nitrocarburiert, geölt

Material: Free Cutting Steel
Nitrocarburized, lubricated



d_1 Expander ⌀	d_2	l_1	d_3 min.	d_4 + 0,1 - 0,3	l_2 min.	Type		+ IP
4,40	3,7	5,0	4,55	4,0	7,0	LP 900-040	1000	10000
6,40	5,7	6,0	6,55	6,0	8,5	LP 900-060	500	2500
7,40	6,7	6,0	7,55	7,0	8,5	LP 900-070	500	2500
8,45	7,7	7,0	8,6	8,0	9,5	LP 900-080	250	2000
9,60	9,0	7,5	9,75	9,0	10,0	LP 900-090	100	1000
10,65	10,0	8,5	10,8	10,0	11,0	LP 900-100	100	1000
12,75	12,0	9,5	12,9	12,0	12,0	LP 900-120	50	500

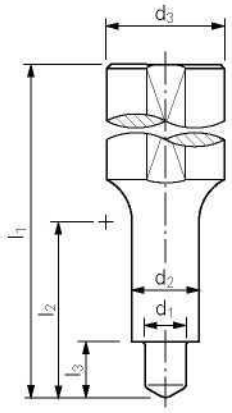
KOENIG expander®

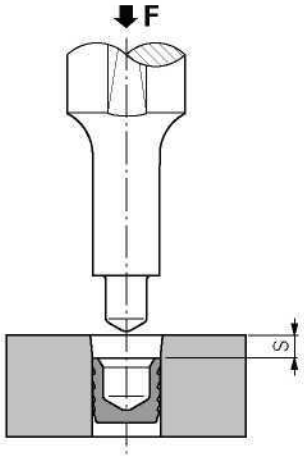
WERKZEUGE TOOLS

Setzwerkzeuge LP, mechanisch — *Setting Tools LP, mechanical*

Setzstempel — *Setting Tool*

Werkzeugstahl vergiitet, Härte ca. HRC 50 — **Tool Steel, tfeaf *treated, hardness approx. HRC 50***





Expander ø	d_1	d_2	d_3 h9	l_1	l_2	l_3	s	Typ
4.40	2,5	3,7	10	100	10	3,80	1,0	LP 040
5.40	3,1	4,7	10	100	15	4,76	1,3	LP 050
6.40	3,8	5,7	10	100	15	4,79	1,3	LP 060
7.40	4,6	6,7	10	100	15	4,74	1,5	LP 070
8.45	5,3	7,7	10	100	20	5,77	1,8	LP 080
9.60	6,5	8,7	14	100	20	6,23	1,8	LP 090
10.65	7,4	9,7	14	100	25	6,96	2,0	LP 100
12,75	9,1	11,7	14	100	25	7,94	2,0	LP 120

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge LP, hydro-pneumatisch

Tischpresse

Mit Kraft - Wegiiberwachung

Setting Tools LP, hydropneumatic

Table Press

Force and distance controlled

C€

Type ExPress 3000

Hydropneumatische Montageeinrichtung für die Montage von KOENIG-Expander der Serien MB und LPvon 0 3-10 mm. Ein schneller Werkzeugwechsel erspart lange Umrüstzeiten. Der notwendige Arbeitshub istvorprogrammiert und nach zu verarbeitendem Expander-Typ abrufbar (max. 32 Speicherplätze). Ausserdem wird der Arbeitshub bei jedem einzelnen Expander neu referenziert, was eine hohe Prozesssicherheit und Verarbeitungsqualität garantiert. Die Presse verfügt über eine Kraft-Weg-Überwachung; entsprechende Daten lassen sich zur späteren Verarbeitung auf einem kundenseitigen Computer mittels RS232 Schnittstelle aufzeichnen. Die dazu notwendige Software ist im Lieferumfang enthalten.

Hydropneumatic assembly unit for the installation of KOENIG-Expander series MB and LP from 0 3-10 mm. The fast tool change avoids long changeover times. The needed working stroke is pre-programmed and available according to the required type of Expander (max. 32 memory positions). The working stroke is referenced at each single Expander, what guarantees a continuous process quality. The press provides a force-way-survey; corresponding data can be recorded on a customer sided computer with a RS232 interface for a later processing. The needed software is included in the scope of delivery.

Technische Daten:		***Technical Data:***	
Höhe	ca. 1360 mm	*Height*	*approx. 1360 mm*
Breite	ca. 340 mm (max. 530 mm)	*Width*	*approx. 340 mm (max. 530 mm)*
Tiefe	ca. 495 mm	*Depth*	*approx. 495 mm*
Arbeitsraum	250 x 200 mm	*Working Space*	*250 x 200 mm*
Presskraft	ca. 30 kN	*Pressing Force*	*approx. 30 kN*
Pinolenhub	60 mm, (Arbeitshub 10 mm)	*Cylinder Ram*	*60 mm, (Working Stroke 10 mm)*
Gewicht	ca. 140 kg	*Weight*	*approx. 140 kg*

Weitere Ausführung: **Typ ExPress 5000**

Tischpresse für die Montage von KOENIG-Expander der Serien MB und LP von 012-22 mm (03-22 mm auf Anfrage)

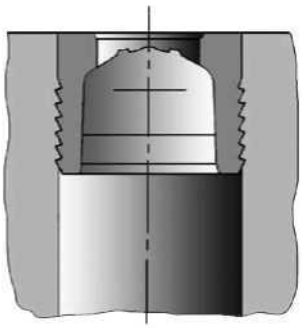
Another Type: ***ExPress 5000***

Table press for the installation of KOENIG-Expander series MB and LP from 0 12-22 mm (0 3-22 mm on request)

KOENIG expander®

Serie LK

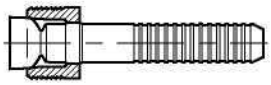
LK Series



- Keine Axialbelastung des Bauteils
- Direkteinbau in Nennbohrung (Systembohrung)
- Sehr kurze Einbaumasse
- Schnelle Montage
- Korrosionsbeständige Ausführung
- Betriebsdruckleistungen bis 60 bar

- *No axial loading imposed on component*
- *Very fast installation by means of handy tools*
- *Installs directly into drilled hole, no additional machining required*
- *Shortest installation length*
- *Corrosion resistant execution*
- *Rated pressure performances up to 60 bar*

KOENIG expander®



Dichtstopfen LK

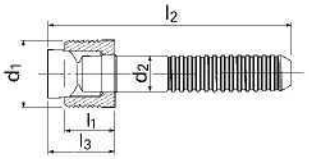
Sealing Plugs LK

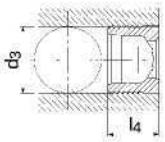
LK600

LK600

Hiilse: Nichtrostender, Spez. Ölfilm
Stiff: Nichtrostender Stahl, Spez. Ölfilm

Sleeve: Stainless Steel Special oil film lubrication
Mandrel: Stainless Special oil film lubrication

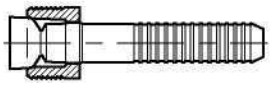




ROSTFREI INOX

d_1	l_1	d_2	l_2	d_3 +0,12 0	l_3 max.	l_4 max.	Type		+ IP
4,0	3,7	2,2	33	**4,0**	6,05	4,0	LK 600-040	100	1000
5,0	4,5	2,5	36	**5,0**	7,40	4,8	LK 600-050	100	1000
6,0	5,0	3,2	36	**6,0**	8,20	5,5	LK 600-060	100	1000
7,0	5,5	3,8	32	**7,0**	9,05	5,8	LK 600-070	100	500
8,0	6,5	4,3	34	**8,0**	10,75	7,0	LK 600-080	100	500
10,0	7,0	4,9	34	**10,0**	11,25	7,5	LK 600-100	100	500

KOENIG
expander



Dichtstopfen LK

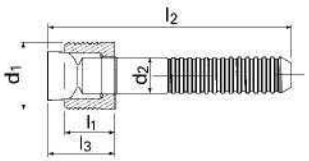
Sealing Plugs LK

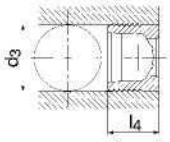
LK950

LK950

Hiilse: Einsatzstahl, weichgegliiht, gebläut
Stiff: Stahl blank, geölt

Sleeve: Case Hardening Steel Soft annealed gun finish
Mandrel: Steel plain finish Special oil film lubrication





d_1	l_1	d_2	l_2	d_3 +0,12 0	l_3 max.	l_4 max.	Type		+ IP
4,0	3,7	2,2	36	**4,0**	5,5	4,0	LK 950-040	100	1000
5,0	4,5	2,95	36	**5,0**	6,9	4,8	LK 950-050	100	1000
6,0	5,0	3,4	36	**6,0**	7,7	5,3	LK 950-060	100	1000
7,0	5,5	4,2	34	**7,0**	8,5	5,8	LK 950-070	100	500
8,0	6,5	4,3	34	**8,0**	9,8	6,8	LK 950-080	100	500
9,0	6,5	4,7	34	**9,0**	9,8	6,8	LK 950-090	100	500
10,0	6,5	5,1	36	**10,0**	9,8	6,8	LK 950-100	100	500
12,0	7,5	5,9	36	**12,0**	11,7	7,8	LK 950-120	100	500
14,0	8,0	5,9	36	**14,0**	12,2	8,7	LK 950-140	100	250
16,0	10,5	5,9	42	**16,0**	16,5	11,5	LK 950-160	100	250
18,0	12,0	6,15	46	**18,0**	18,6	13,0	LK 950-180	100	200

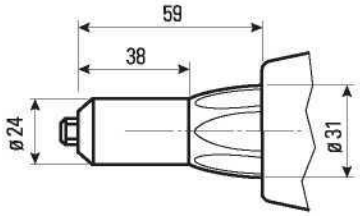
KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge LK, mechanisch / *Setting Tools LK, mechanical*

Hebelschere / *Hand Lever Tool*

Inkl. Mundstiicke / ***Nosepieces included***



Type KW-008

Technische Daten:		***Technical Data:***	
Gewicht	1,95 kg	*Weight*	*1,95 kg*
Werkzeuglänge	515 mm	*Length*	*515 mm*

Ausrüstung / *Equipment*

Expander ⌀	Mundstück *Nosepiece* Type
4,0	DPM400-B10
5,0	DPM400-D10
6,0	DPM400-E10

Expander ⌀	Klemmbacken *Jaws* Type
4,0 - 6,0	PRG 540-46E

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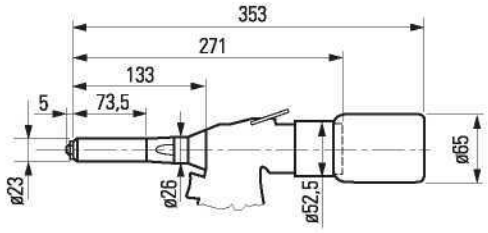
WERKZEUGE TOOLS

Setzwerkzeuge LK	*Setting Tools LK*
hydro-pneumatisch	*Hydraulic / Pneumatic Tool*
Mit Nagelabsaugvorrichtung	*With mandrel collection device*
Ohne Ausriistung	***Without Equipment***

CE



Type ExTool-030

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,5 kg	*Weight*	*2,5 kg*

Ausrüstung / *Equipment*

* Nur für LK 600

Expander ⌀	Mundstück *Nocepiece* Typ
4,0	361013304100
4,0 *	361013304110
5,0	361013305100
6,0	361013306100

Ersatzteile / *Spare parts*

** For LK600 only*

Expander ⌀	Klemmbacken *Jaws* Typ
4,0 - 6,0	361130400504

Expander ⌀	Klemmbackengehäuse *Jaw case* Typ
4,0 - 6,0	321020000012

Expander ⌀	Stössel *Jaw pusher* Typ
4,0 - 6,0	361013304010

KOENIG expander®

WERKZEUGE TOOLS

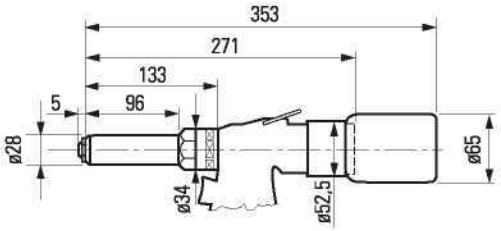
Setzwerkzeuge LK / *Setting Tools LK*

hydro-pneumatisch / *Hydraulic / Pneumatic Tool*

Mit Nagelabsaugvorrichtung / *With mandrel collection device*

Ohne Ausriistung / ***Without Equipment***

CE



Type ExTool-040-1

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,7 kg	*Weight*	*2,7 kg*

Ausrüstung / *Equipment*

Expander ⌀	Mundstück *Nocepiece*
	Typ
7,0	361013307100
8,0	361013308100
9,0	361013309100
10,0	361013310100

Ersatzteile / *Spare parts*

Expander ⌀	Klemmbacken *Jaws*
	Typ
7,0 - 10,0	361130400507-3-1

Expander ⌀	Klemmbackengehäuse *Jaw case*
	Typ
7,0 - 10,0	361059120013

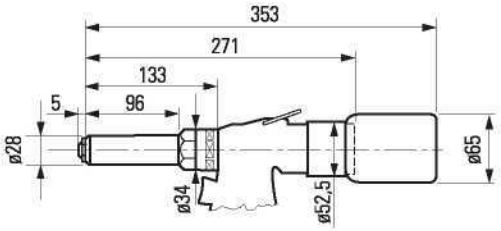
Expander ⌀	Stössel *Jaw pusher*
	Typ
7,0 - 10,0	361013307010

KOENIG expander®

WERKZEUGE TOOLS

Setzwerkzeuge LK	*Setting Tools LK*
hydro-pneumatisch	*Hydraulic / Pneumatic Tool*
Mit Nagelabsaugvorrichtung	*With mandrel collection device*
Ohne Ausriistung	***Without Equipment***

CE



Type EXTOOL-040-2

Technische Daten:		***Technical Data:***	
Betriebsdruck	max. 7 bar	*Air pressure*	*max. 7 bar*
Gewicht	2,7 kg	*Weight*	*2,7 kg*

Ausrüstung / Equipment

Expander ⌀	Mundstück *Nocepiece*
	Typ
12,0	361013312100
14,0	361013314100
16,0	361013316100
18,0	361013318100

Ersatzteile / *Spare parts*

Expander ⌀	Klemmbacken *Jaws*
	Typ
12,0 - 18,0	361130400512-3-1

Expander ⌀	Klemmbackengehäuse *Jaw case*
	Typ
12,0 - 18,0	3610591200013

Expander ⌀	Stössel *Jaw pusher*
	Typ
12,0 - 18,0	361013307010

KOENIG expander®

NOTIZEN / *NOTES*

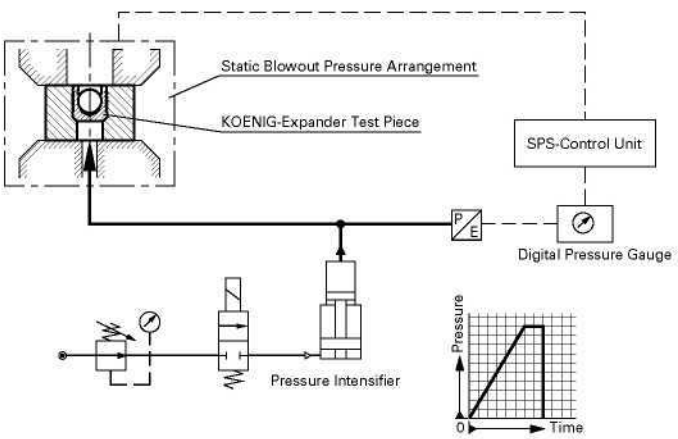
Contents

KOENIG expander®

Pressure Performance Tests-KOENIG-Expander

Test ® Pressure Test To Failure

In Test ® the KOENIG-Expander is subject to increasing static pressure until plug blowout occurs. These tests are done by KVT for functional testing during manufacturing runs. Each production lot (Batch No.) undergoes these tests.

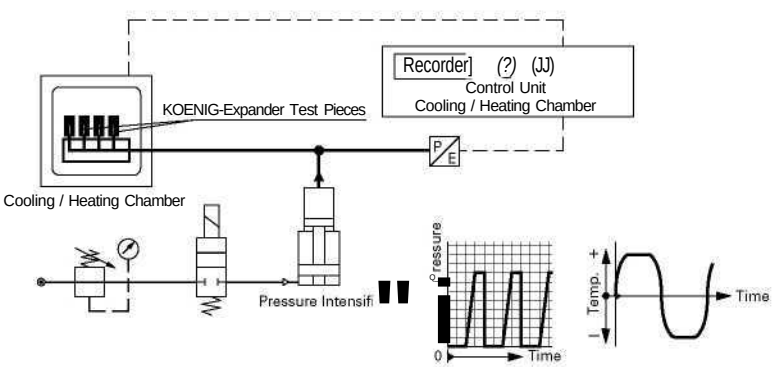


Test ® Temperature/Pressure Cycling

In Test ® the KOENIG-Expander is subject to a long term test simulating practical conditions. This determines the pressure which can be applied (lower limit) without plug blowout, with intermittent pressure and varying temperature.

Conditions

Temperature:	2 hours at+100 °C, 2 hours at -40 °C Series LK and LP partiell 2 hours at+150°C, 2 hours at -40 °C
Temperature change:	between 30 and 45 minutes
Pressure:	intermittent 2 minutes at 0 bar, 3 minutes at test pressure.
Duration:	170 h (Long term test)
Drill Hole:	Tolerances, roundness, and roughness per data sheets Plain surface Distance from edge per data sheets.



KOENIG expander®

Base Material / Conditions

The working pressure specifications on the preceding page are obtainable under the following conditions:

Base Material of the Installation		Tensile Strength (avg.) Rm [N/mm²]	Elongation (min.) A5 [%]	Ultimate Strength (avg.) Rp0.2 [N/mm²]	Hardness (min.) HB
①	High Strength St. ETG-100 AISI 1144	1'000	6	865	280
②	Free Machining Case Hard. Stl. C15Pb 1.0403	560	6	300	180
③	Cast Iron EN-GJL-250 EN 1561	250	–	–	160
④	Ductile Cast Iron EN-GJS-500-7 EN-1563	500	7	320	170
⑤	Aluminium-Alloy AlCuMg2 3.1355 / AA2024	480	8	380	120
⑥	Aluminium-Alloy AlMgSiPb 3.0615 / ~AA6262	340	8	300	90
⑦	Cast Al Alloy G-AlSi7Mg 3.2371 / AA356-T6	300	4	250	80

- Equivalent working pressure capability can be obtained when using base materials with similar mechanical characteristics. However, the appropriate installation instructions must be followed.
- **Applications for cast aluminium, magnesium alloy, other non-ferrous metals and non-metallic materials upon request.**
- Factors which may lower the working pressure capability are:
  - anchorage principle
  - bore roughness requirements
  - design guidlines
- Anchorage between sleeve and base material is achieved when the sleeve is a minimum of HB = 30 greater than the base material. If the hardness difference is less, hole roughness of 10 to 30 µm is needed to achieve indicated working pressures.

Security Range

The security range (the difference between working pressure and Test © pressure) allows for uncontrollable variations. For instance, dynamic loading at 1 million cycles and a frequency of 3-4 Hz has shown that burst pressure Test ® and Test © pressure are reduced about 20% after this point.

KOENIG expander®

T

Pressure Performance

Series MB 600		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 3–10		1'400 bar / 20'300 psi 450 bar / 6'500 psi					1'200 bar / 17'400 psi 380 bar / 5'500 psi	
ø 12–14		1'000 bar / 14'500 psi 350 bar / 5'100 psi					900 bar / 13'000 psi 280 bar / 4'100 psi	
Hole	Tolerance	0 / +0,1 mm						
	Roughness	R_z 10–30µm		Anchorage in base metal				

Series MB 600 Inch		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 0,093–0,281		1'400 bar / 20'300 psi 450 bar / 6'500 psi					1'200 bar / 17'400 psi 380 bar / 5'500 psi	
Hole	Tolerance	ø 0,093 0 / +0,002 Inch from ø 0,125 0 / +0,004 Inch						
	Roughness	R_z 10–30µm		Anchorage in base metal				

Series MB 700		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 3–10		1'400 bar / 20'300 psi 450 bar / 6'500 psi					1'200 bar / 17'400 psi 380 bar / 5'500 psi	
ø 12–22		1'150 bar / 16'700 psi 350 bar / 5'100 psi					900 bar / 13'000 psi 280 bar / 4'100 psi	
Hole	Tolerance	0 / +0,1 mm						
	Roughness	R_z 10–30µm		Anchorage in base metal				

Series MB 850		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 3–10		1'100 bar / 16'000 psi 350 bar / 5'100 psi					1'000 bar / 14'500 psi 320 bar / 4'600 psi	
ø 12–22		900 bar / 13'000 psi 280 bar / 4'100 psi					800 bar / 11'600 psi 250 bar / 3'600 psi	
Hole	Tolerance	0 / +0,1 mm						
	Roughness	R_z 10–30µm				Anchorage in base metal		

Proof Pressure Test ©
Max. allowable Working Pressure = Nominal Pressure

KOENIG expander®

Pressure Performance

Series SK		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 4–10		1'600 bar / 23'200 psi 500 bar / 7'200 psi					1'400 bar / 20'300 psi 450 bar / 6'500 psi	
Hole	Tolerance	0 / +0,12 mm						
	Roughness	R_z 10–30µm				Anchorage in base metal		

If SK plugs are used to keep channels separated, allowable working pressure on the insertion side is reduced by 50%.

Series HK		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 3–10		1'200 bar / 17'400 psi 350 bar / 5'100 psi				500 bar / 7'200 psi 160 bar / 2'300 psi		
Hole	Tolerance	0 / +0,1 mm						
	Roughness	R_z 10–30µm				Roughness anchoring not effective Anchorage in base metal not possible		

If HK plugs are used to keep channels separated, allowable working pressure on the insertion side is reduced by 50%.

Proof Pressure Test ©
Max. allowable Working Pressure = Nominal Pressure

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Pressure Performance

Series LP		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 4–12		180 bar / 2'600 psi 60 bar / 850 psi					180 bar / 2'600 psi 60 bar / 850 psi	
Hole	Tolerance	as per specification sheet						
	Roughness	R_z 10–30µm				Anchorage in base metal		

①②③④⑤ Temperature range for Proof Pressure Test Ⓑ: –40 °C bis +150 °C
⑥⑦ Temperature range for Proof Pressure Test Ⓑ: –40 °C bis +100 °C

Series LK 600		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 4–12		180 bar / 2'600 psi 60 bar / 850 psi					180 bar / 2'600 psi 60 bar / 850 psi	
Hole	Tolerance	0 / +0,12 mm						
	Roughness	R_z 10–30µm		Anchorage in base metal				

①②③④⑤ Temperature range for Proof Pressure Test Ⓑ: –40 °C bis +150 °C
⑥⑦ Temperature range for Proof Pressure Test Ⓑ: –40 °C bis +100 °C

Series LK 950		Base material of the Installation						
		① ETG-100	② C15Pb	③ EN-GJL-250	④ EN-GJS-500-7	⑤ AlCuMg2	⑥ AlMgSiPb	⑦ G-AlSi7Mg
ø 4–16		180 bar / 2'600 psi 60 bar / 850 psi					180 bar / 2'600 psi 60 bar / 850 psi	
Hole	Tolerance	0 / +0,12 mm						
	Roughness	R_z 10–30µm					*	**

①②③④⑤ Temperature range for Proof Pressure Test Ⓑ: –40 °C bis +150 °C
⑥⑦ Temperature range for Proof Pressure Test Ⓑ: –40 °C bis +100 °C

* partial anchorage in base material
** anchorage in base material

KOENIG-Expander Sealing Plugs series LK are not suitable for pressure load applied on the insertion side of the plug. For special release contact KVT.

Proof Pressure Test ®
Max. allowable Working Pressure = Nominal Pressure

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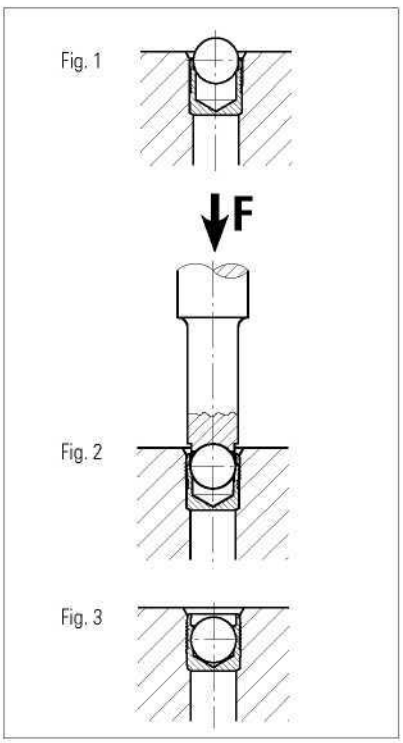
Installation Instruction for MB Series

Drilled Hole

- The drilled hole must be within the tolerances shown on the preceding dimensional sheets.
- The counterbored hole (d_2) must be properly sized for the through hole (d_3) according to the dimensional sheets.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from R_Z = 10-30 µm for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.



Setting Procedure

- With the ball facing out the KOENIG-Expander is inserted in the counterbored hole. The top sleeve should not be above the surface of the base material (Fig. 1).
- With only a slight or no counterbore, the base of the sleeve must be adequately supported during installation.
- The ball can now be pressed in until the top of the ball is below the edge of the sleeve (Fig. 2 and 3). Corresponding approximate values for stroke S as well as the dimensions X are from the Table below.

Note:

- Use the proper size setting tool for the KOENIG-Expander according to the data sheet.
- Cleaning/degreasing of plugs before installation, only spray cleaning with air drying allowed. (No dipping and vacuum drying).

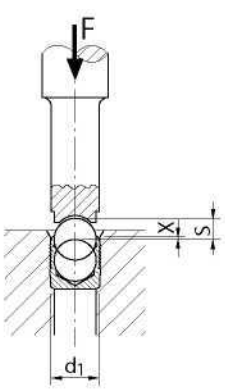
Press

Small quantities or single parts can be installed with a hammer and setting tool. Installation can also be done with an arbor press. It is preferred to limit travel when using a press because insertion force is difficult to control. KOENIG-Expanders are also ideal for automated installation because they are problem free.

Installation Chart

MB 600 / MB 700 / MB 850 Series															
d_1 [mm]		3	4	5	6	7	8	9	10	12	14	16	18	20	22
S [mm]	Stroke (approx. values)	1,2	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,5	6,35	7,0	8,0	9,0	10,0
X [mm] ±0,2	Position of top of ball relative to top of sleeve	0,4	0,2	0,4	0,4	0,4	0,3	0,4	0,4	0,4	0,4	0,6	0,6	0,8	0,8

MB 600 Series Inch-Version								
d_1 [in]		.093	125	156	187	218	250	281
S [in]	Stroke (approx. values)	.031	.047	.059	.079	.094	.109	.118
X [in]	Position of top of ball relative to top of sleeve	Flush to .012 below the sleeve						



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Installation Instructions MB Series

Plug Removal

With KOENIG-Expander MB Series removal of the plug is possible. The plug can be drilled out with a carbide tipped drill or with a high speed steel drill.

MB 600-030 to 140	Ball HB ~200:	High Speed Steel Drill
MB 600-093 A	Ball HRC ~55:	Carbide Tipped Drill
MB 600-125 A to 281 A	Ball HB ~200:	High Speed Steel Drill
MB 700-030 to 220	Ball HRC ~45:	Carbide Tipped Drill
MB 850-040 to 220	Ball HRC ~45:	Carbide Tipped Drill

Procedure

- To Expander-Diameter 6 mm or .250 inch:
  Drill out, in one process, to the **next larger diameter** according to the data sheet.
- Expander-Diameter over 6 mm or .250 inch:

  Drill out in several steps with last step to the **next larger diameter** according to the data sheet.
- Clear chips, remnants of the sleeve, and oil and grease from the bore.
- Install a new KOENIG-Expander.
- **Note:** After plug removal always use the next larger size plug.

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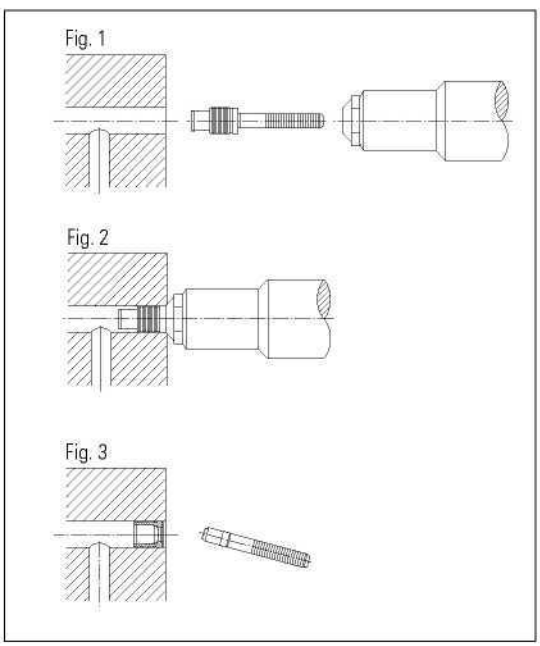
Installation Instruction SK Series

Drilled Hole

- The drilled hole must be within the tolerances shown on the preceding data sheets.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from R_Z = 10-30 µm for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.



Setting Procedure

- Insert the plug in the tool, making sure that the sleeve is against the nosepiece (Fig. 1).
- After inserting the plug into the hole (making sure the tool is flush to the work surface) activate the tool to expand the plug. The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).

Note:

- The assembly of KOENIG-Expanders should only be done in a **clean working area.**
- Sleeve and mandrel of the plug should not be **cleaned or lubricated.**

Tools

For trouble free installation of KOENIG-Expanders use the tools and appropriate components according to the data sheet.

Plug Removal

With KOENIG-Expander SK Series plug removal is possible.
Procedure:

1. Drive the mandrel from the sleeve with a punch.
2. Drill out the sleeve and remove the mandrel.
3. Bore the hole to the **next larger Expander diameter** per the data sheet.
4. Clear chips, remnants of the sleeve, and oil and grease from the bore.
5. Install a new KOENIG-Expander.

Note: After plug removal always install the next larger size plug.

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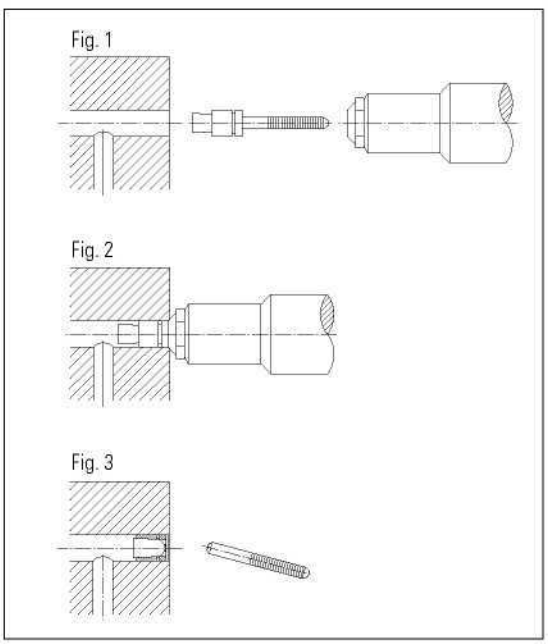
Installation Instruction HK Series

Drilled Hole

- The drilled hole must be within the tolerances shown on the preceding data sheets.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from RZ = 10-30 µm for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.



Setting Procedure

- Insert the plug in the tool, making sure that the sleeve is against the nosepiece (Fig. 1).
- After inserting the plug into the hole (making sure the tool is flush to the work surface) activate the tool to expand the plug. The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).
- When correctly installed, the tapered portion of the mandrel will be below the sleeve surface (Fig. 3).
  A projecting mandrel indicates an over tolerance hole or too thin wall thickness.

Note:

- The assembly of KOENIG-Expanders should only be done in a **clean working area.**
- Sleeve and mandrel of the plug should not be **cleaned or lubricated.**

Tools

For trouble free installation of KOENIG-Expanders use the tools and appropriate components according to the data sheet.

Plug Removal
With KOENIG-Expander HK Series plug removal is possible.

Procedure:

1. Drive the mandrel from the sleeve with a punch.
2. Drill out the sleeve and remove the mandrel.
3. Bore the hole to the **next larger Expander diameter** per the data sheet.
4. Clear chips, remnants of the sleeve, and oil and grease from the bore.
5. Install a new KOENIG-Expander.

Note: After plug removal always install the next larger size plug.

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Installation Instruction LP Series

Drilled Hole

- The drilled hole must be within the tolerances shown on the dimensional sheets.
- The cone rate 1:12 must be kept as per specification sheet.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from R_Z = 10-30 µm for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.

Fig. 1

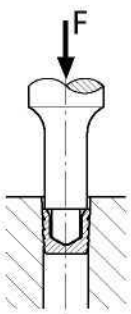


Fig. 2

Fig. 3

Setting Procedure

- With the setting hole facing out, the LP-plug is inserted in the cone bore. The top sleeve should not be above the surface of the base material (Fig. 1).
- The LP-plug can now be pressed in with the setting tool. Corresponding approximate values for stroke S are from the table below (Fig. 2).
- Installed LP-plug (Fig. 3).

Note:

- Use the proper size setting tool for the KOENIG-Expander according to the data sheet.
- Through washing of the LP-plugs before installation, higher setting force might occur.

Press

- It is preferred to limit travel when using a press because insertion force is difficult to control.
- Recommended setting speed is 5 mm/sec.

The KOENIG-Expander assuring an optimum orientation, it works perfectly with automatic processing.

Plug Removal

With KOENIG-Expander LP Series plug removal is possible. The plug can be drilled out with a high speed steel drill.

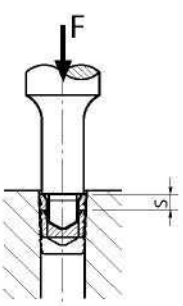
Procedure:

1. Drill out, in one process, to the next larger diameter, nominal diameter d_4 according to the data sheet.
2. Drill the taper hole with a reamer up to diameter d_3 according to the data sheet.
3. Clear chips, remnants of the sleeve, and oil and grease from the bore.
4. Install a new KOENIG-Expander.

Note: After plug removal always install the next larger size plug.

Installation Chart

Series LP 900 –		040	050	060	070	080	090	100	120
S [mm] ±0.25	Stroke (average value)	1.0	1.3	1.3	1.5	1.8	1.8	2.0	2.0
in steel, grey cast nodulized cast iron in aluminium wrought alloy, aluminium-cast material									



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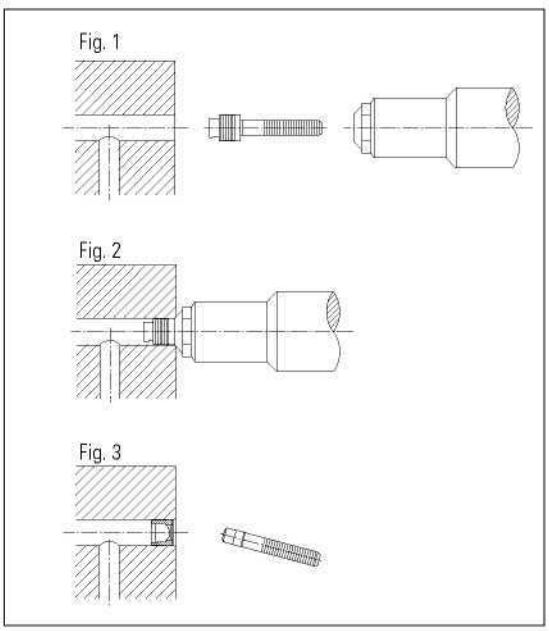
Installation Instruction LK Series

Drilled Hole

- The drilled hole must be within the tolerances shown on the dimensional sheets.
- Holes must be round within 0.05 mm.
- With hard materials the bore roughness should be from R_z = 10-30 µm for best results.
- Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- The bore must be free of oil, grease and chips.



Setting Procedure

- Insert the plug in the tool, making sure that the sleeve is against the nosepiece (Fig. 1).
- After inserting the plug into the hole activate the tool to expand the plug. The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).

Note:

- The assembly of KOENIG-Expanders should only be done in a **clean working area.**
- Sleeve and mandrel of the plug should not be **cleaned or lubricated.**

Tools

For trouble free installation of KOENIG-Expanders use the tools and appropriate components according to the data sheet.

Plug Removal

With KOENIG-Expanders LK Series plug removal is possible.

Procedure:

1. Drive the mandrel from the sleeve with a punch.
2. Drill out the sleeve and remove the mandrel.
3. Bore the hole to the **next larger Expander diameter** per the data sheet.
4. Clear chips, remnants of the sleeve and oil and grease from the bore.
5. Install a new KOENIG-Expander.

Note: After plug removal always install the next larger size plug.

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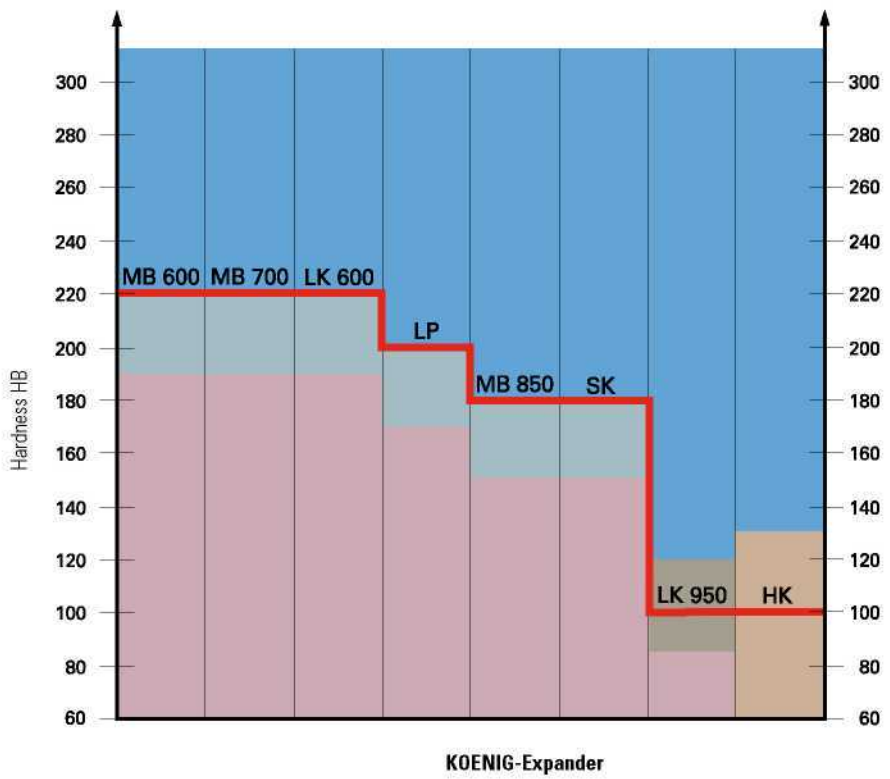
Anchorage Principle

The required bore roughness is directly related to the hardness and the mechanical characteristics of the base material. Depending on the combination of sealing plug and base material, anchorage takes place either by the groove profile of the expander sleeve biting into the base material or on anchorage to the surface roughness of the bore.

Note:
When selecting a KOENIG-Expanderthe bore roughness must always be adjusted according to the hardness of the base material.

Anchorage principle related to the base material



Hard base material: To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. **Roughness R_z = 10 to 30 µm.**

Soft base material: Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve of the KOENIG-Expander.

Soft base material: Anchorage is not possible with the HK Series. Such combinations are not allowed **for high pressure applications.**

Transition zone: To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. **Roughness R_z = 10 to 30 µm.**

Transition zone: To provide for the allowable pressure rating, the serration of the sleeve, anchors into the base material.

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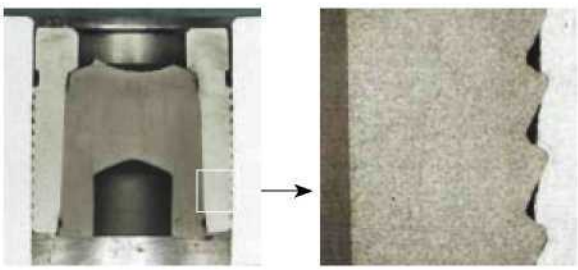
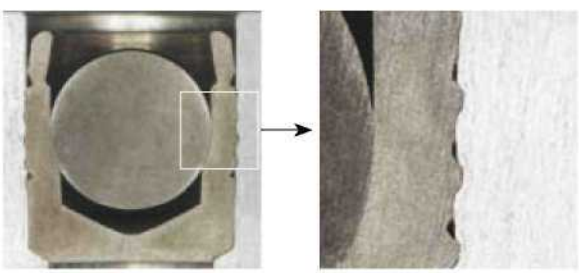
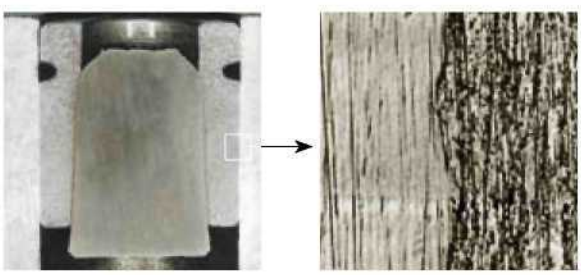
Anchorage Principle



Anchorage due to plug sleeve serrations KOENIG-Expander **Series SK**
in aluminum-alloy HB = 90

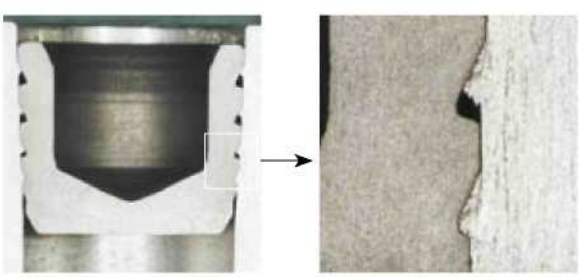
Anchorage due to plug sleeve serrations
KOENIG-Expander **Series MB 850**
in aluminum-alloy HB = 90

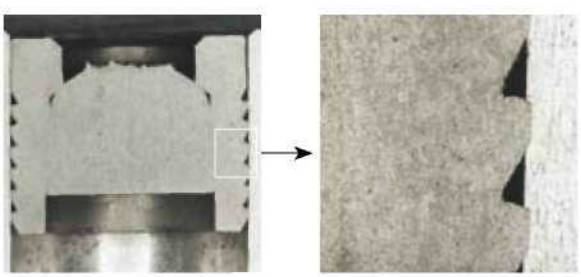




Anchorage due to bore roughness
KOENIG-Expander **Series HK**
in gray cast iron HB = 160

Anchorage due to plug sleeve serrations
KOENIG-Expander **Series LP**
in aluminum alloy HB = 90





Sufficient anchorage due to plug sleeve serrations
KOENIG-Expander **Series LK 950**
in aluminum alloy HB = 90

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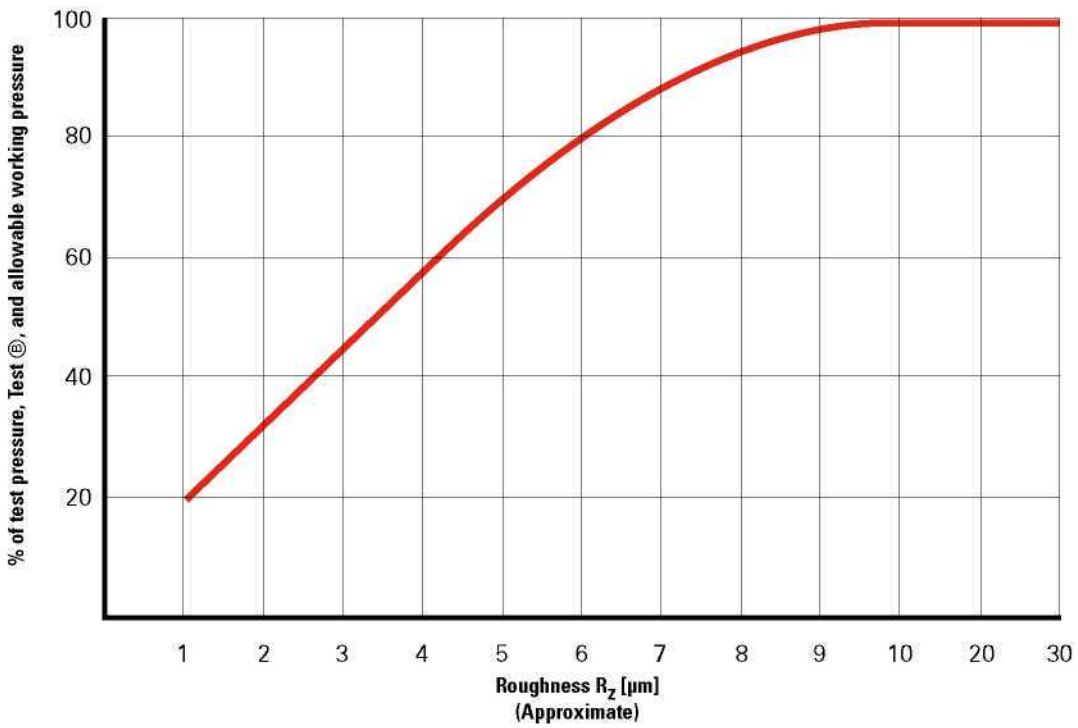
Bore Roughness Requirements

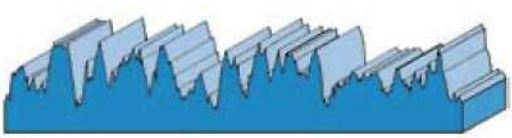
When installing KOENIG-Expanders in hard base material no positive anchoring is possible. So, to attain suitable working pressures and anchorage, it is necessary to have a bore roughness of RZ = 10-30 µm. At a roughness greater than R_Z = 30 µm leakage might occur.

Pressure performance correlation to bore roughness.



Roughness Profile

Required roughness profile



The ideal bore roughness for anchorage is attained by drilling with a twist drill or core drill.

Undesirable roughness profile

By reaming, a one-sided, smooth roughness profile is created. This is not desirable.

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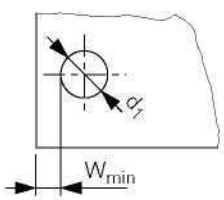
Design Guidelines

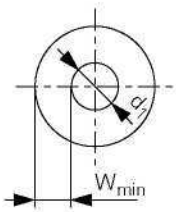
Wall thickness/distance from edge

As the radial expansion of the KOENIG Expander sleeve occurs, the base material in which it will be anchored plastically deforms. The resultant strength, as well as the hydraulic pressure and temperature service conditions depending on the Expander type and characteristics of the base material, require minimum wall thickness, or distance from edge.

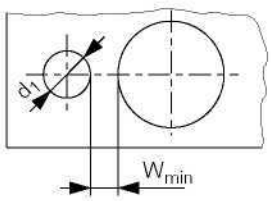
Distance to external wall



Distance to exterior wall



Wall thickness between bores



The guideline values for minimum wall thickness and distance from edge (W_{min}) express these influencing factors. At these minimum values, only slight deformation on the exterior profile of the base material of less than 20 µm is likely. This does not affect the function of the KOENIG Expander. Below the guideline values (W_{min}) the possibility of overloading the base material exists, which can adversely influence the function of the KOENIG Expander. In such cases tests must be conducted.

Guideline values W_{min} for wall thickness and distance from edge

At KOENIG-Expander diameters Series MB / SK / HK and LP

$\mathbf{d_1 \geq 4\ mm: W_{min} = f_{min} \cdot d_1}$

$\mathbf{d_1 < 4\ mm: W_{min} = f_{min} \cdot d_1 + 0{,}5\ mm}$

At KOENIG-Expander diameters Series LK

$\mathbf{d_1 \geq 5\ mm: W_{min} = f_{min} \cdot d_1}$

$\mathbf{d_1 = 4\ mm: W_{min} = f_{min} \cdot d_1 + 0{,}5\ mm}$

Base material		①	②	③	④	⑤	⑥	⑦
	Description	ETG 100	C15Pb	EN-GJL-250	EN-GJS-500-7	AlCuMg2	AlMgSiPb	G-AlSi7Mg
	Avg. tensile strength Rm [N/mm²]	1000	560	250	500	480	340	300
	Min. elongation A5 [%]	6	6	–	7	8	8	4
	Avg.ultimate strength R_p 0,2 [N/mm²]	865	300	–	320	380	300	250
Koenig-Expander Series		Factor f_{min}						
MB 600		0,6	0,8	1,0	0,8	0,8	1,0	1,0
MB 600, Inch-Version		0,6	0,8	1,0	0,8	0,8	1,0	1,0
MB 700		0,6	0,8	1,0	0,8	0,8	1,0	1,0
MB 850		0,5	0,6	1,0	0,6	0,6	1,0	1,0
SK		0,5	0,6	1,0	0,6	0,6	1,0	1,0
HK		0,4	0,5	0,8	0,5	0,5	0,8	0,8
LP		0,3	0,3	0,5	0,3	0,4	0,5	0,5
LK 600		0,3	0,3	0,6	0,5	0,4	0,5	0,5
LK 950		0,3	0,3	0,6	0,5	0,4	0,5	0,5

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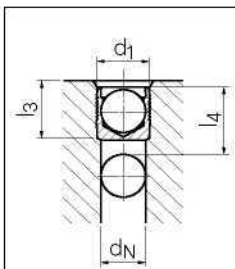
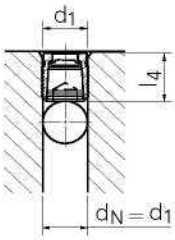
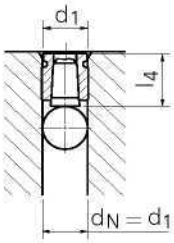
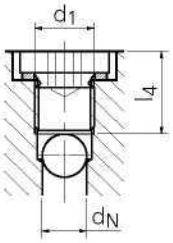
Design Guidelines

Required Installation Lengths









d_N	MB Series			SK Series		HK Series		Treaded Plugs DIN 908	
	d_1	l_3 min	l_4 min *	d_1	l_4 max	d_1	l_4 max	d_1	l_4 max
2,0	3,0	3,4	5,0						
3,0	4,0	3,8	5,5			3,0	7,0		
4,0	5,0	5,3	7,0	4,0	6,5	4,0	8,0		
5,0	6,0	6,3	8,5	5,0	7,5	5,0	9,5	M8x1	11,5
6,0	7,0	7,3	9,5	6,0	8,0	6,0	10,0	M8x1	11,5
7,0	8,0	8,3	11,0	7,0	9,0	7,0	11,0	M10x1	12,0
8,0	9,0	9,8	12,5	8,0	10,5	8,0	11,5	M10x1	12,0
9,0	10,0	10,8	13,5	9,0	11,0	9,0	13,0	M12x1,5	16,0
10,0	12,0	12,8	16,0	10,0	12,5	10,0	13,5	M12x1,5	16,0
12,0	14,0	14,5	18,0					M14x1,5	16,5
14,0	16,0	16,5	20,0					M16x1,5	16,5
16,0	18,0	18,5	22,5					M18x1,5	17,5
18,0	20,0	21,5	25,5					M20x1,5	19,5
20,0	22,0	24,5	28,5					M22x1,5	19,5

d_N = given nominal bore / system bore size

* **Installation Lengths MB Series**

The required installation length (l4) min. for MB plugs is for base materials with hardness greater than HB=90. For softer materials, deeper installation is required.

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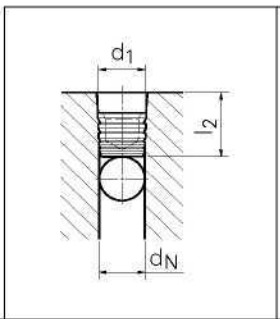
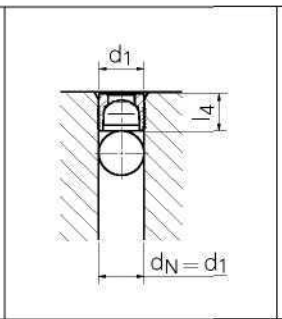
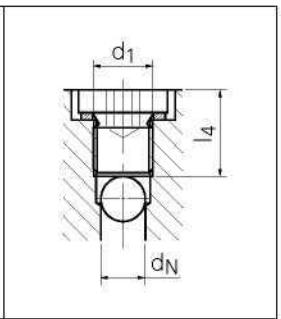
Design Guidelines

Required Installation Lengths







d_N	LP Series		LK Series		Threaded Plugs DIN 908	
	d_1	l_3 min	d_1	l_4 max	d_1	l_4 max
4,0	4,40	7,0	4,0	4,0		
5,0	5,40	8,0	5,0	4,8	M8x1	11,5
6,0	6,40	8,5	6,0	5,3	M8x1	11,5
7,0	7,40	8,5	7,0	5,8	M10x1	12,0
8,0	8,45	9,5	8,0	6,8	M10x1	12,0
9,0	9,60	10,0	9,0	6,8	M12x1,5	16,0
10,0	10,65	11,0	10,0	6,8	M12x1,5	16,0
12,0	12,75	12,0	12,0	7,8	M14x1,5	16,5
14,0			14,0	8,7	M16x1,5	16,5
16,0			16,0	11,5	M18x1,5	17,5

d_N = given nominal bore / system bore size

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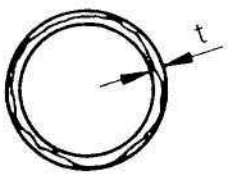
Design Guidelines

Roundness Tolerance

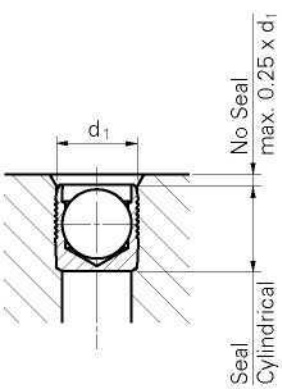
To assure reliable functioning of the KOENIG-Expander with regard to pressure performance and to assure leak tight sealing, a **roundness tolerance of t = 0.05 mm** must be held.

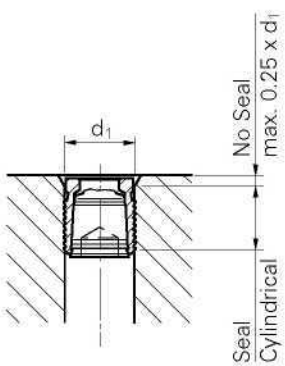


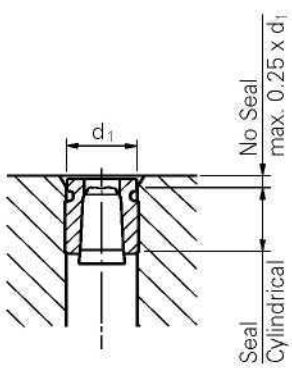
By using a double lipped twist drill, the called out hole and roundness tolerances are reached. Better tolerances, particularly for larger diameter holes, can be held by using a **triple lipped** twist drill.

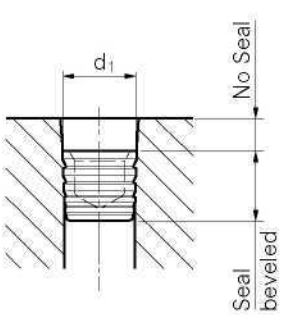
Conicity of the bore

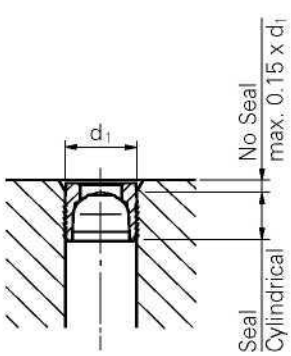
Within the **effective sealing area** of the KOENIG-Expander, the bore must be according to the dimesional sheets. The bore lead in can be beveled up to a depth of **0.25 x d_1 (LK: 0.15 x d_1)** because this area has no significant effect on the sealing function.











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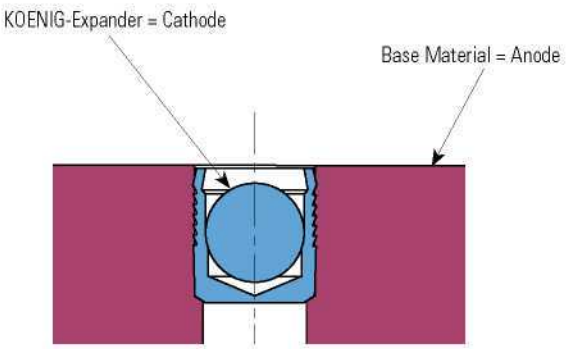
Galvanic Corrosion

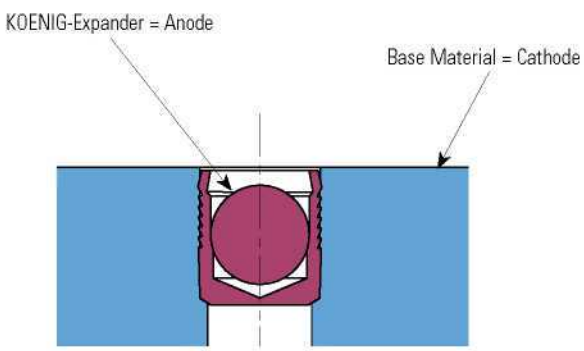
In choosing a KOENIG-Expander you must consider that the material of the sealing plug and the material of the production piece can show different electrical potentials. In the presence of an electrolyte (e.g. 5% Water-NaCl solution), this potential difference causes electrochemical attack on the least noble of the metals in contract - galvanic corrosion. In this case, either the base material or its surface protection will become the anode and will be transferred to the pure metal of the cathode. The corrosion speed or the current density will be determined by the relative surface area or volume of the anode and cathode as illustrated below.

Cathode

Anode



Large Anode Area → Low Current Density at the Anode → **Slow Corrosion**



Small Anode Area → High Current Density at the Anode → **Fast Corrosion**

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Galvanic Corrosion

Effect of Galvanic Corrosion

The following table shows the expected galvanic corrosion behavior of KOENIG-Expanders in common base materials allowing for the relative surface areas of both metals, which influences the speed of corrosion.

Base material			KOENIG-Expander Series							
			MB 600	MB 700	MB 850	SK	HK	LP	LK 600	LK 950
Steel, carbon/low alloy, plain										
Steel, carbon/low, Zn plated, chromate										
Steel, carbon/low alloy, phospatized										
Nitrided or case hardening steel			behavior depends on the method used							
Stainless steel, X 8 CrNiS 18-9, 1.4305, AISI 303										
Stainlesss steel, X 12 CrS 13, 1.4005, AISI 416										
Cast iron, EN 1561, plain										
Cast iron, EN 1561, Zn plated, chromate										
Cast iron, EN 1561, phosphatized										
Ductile cast iron, EN 1563, plain										
Ductile cast iron, EN 1563, Zn plated, chromate										
Ductile cast iron, EN 1563, phosphatized										
AlMg1SiCu	3.3211	AA-Norm 6061								
AlMgSiPb	3.0615	AA-Norm ~6262								
AlCuMg2	3.1355	AA-Norm 2024								
AlZnMgCu1.5	3.4365	AA-Norm 7075								
G-AlSi7Mg	3.2371	AA-Norm 356-T6								
G-AlSi9Mg	3.2373									
G-AlSi10Mg	3.2381									

Key to the galvanic corrosion behavior of KOENIG-Expanders in the presence of an electrolytic medium installed in base materials per the above table:

- Not accelerated
- Lightly accelerated
- Accelerated

Suggestions to prevent galvanic corrosion

- Chose materials with no or low potential difference.
- Use corrosion reducing designs, i.e. if possible prevent the accumulation of fluids on the outer surface of the workpiece.
- By using suitable surface coatings, corrosion attack can be considerably reduced.

Salt spray testing per DIN 50021 can be done in our lab.

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Hardness Conversion Table for Hardenable Carbon and Low Alloy Steel

Zugfestigkeit 2) N/mm²	Vickershärte (F ≥98 n)	Brinellhärte 1) $\left(0{,}102 \cdot \frac{F}{D^2} = 30 \frac{N}{mm^2}\right)$	Rockwellhärte		
			HRB	HRC	HRA
255	80	76,0			
270	85	80,7	41,0		
285	90	85,5	48,0		
305	95	90,2	52,0		
320	100	95,0	56,2		
335	105	99,8			
350	110	105	62,3		
370	115	109			
385	120	114	66,7		
400	125	119			
415	130	124	71,2		
430	135	128			
450	140	133	75,0		
465	145	138			
480	150	143	78,7		
495	155	147			
510	160	152	81,7		
530	165	156			
545	170	162	85,0		
560	175	166			
575	180	171	87,1		
595	185	176			
610	190	181	89,5		
625	195	185			
640	200	190	91,5		
660	205	195	92,5		
675	210	199	93,5		
690	215	204	94,0		
705	220	209	95,0		
720	225	214	96,0		
740	230	219	96,7		
755	235	223			
770	240	228	98,1	20,3	60,7
785	245	233		21,3	61,2
800	250	238	99,5	22,2	61,6
820	255	242		23,1	62,0
835	260	247	[101]	24,0	62,4
850	265	252		24,8	62,7
865	270	257	[102]	25,6	63,1
880	275	261		26,4	63,5
900	280	268	[104]	27,1	63,8
915	285	271		27,8	64,2
930	290	276	[105]	28,5	64,5
950	295	280		29,2	64,8
965	300	285		29,8	65,2
995	310	295		31,0	65,8
1030	320	304		32,2	66,4
1060	330	314		33,3	67,0
1095	340	323		34,3	67,6
1125	350	333		35,5	68,1

Zugfestigkeit 2) N/mm²	Vickershärte (F ≥98 n)	Brinellhärte 1) $\left(0{,}102 \cdot \frac{F}{D^2} = 30 \frac{N}{mm^2}\right)$	Rockwellhärte		
			HRB	HRC	HRA
1155	360	342		36,6	68,7
1190	370	352		37,7	69,2
1220	380	361		38,8	69,8
1255	390	371		39,8	70,3
1290	400	380		40,8	70,8
1320	410	390		41,8	71,4
1350	420	399		42,7	71,8
1385	430	409		43,6	72,3
1420	440	418		44,5	72,8
1455	450	428		45,3	73,3
1485	460	437		46,1	73,6
1520	470	447		46,9	74,1
1555	480	[456]		47,7	74,5
1595	490	[466]		48,4	74,9
1630	500	[475]		49,1	75,3
1665	510	[485]		49,8	75,7
1700	520	[494]		50,5	76,1
1740	530	[504]		51,1	76,4
1775	540	[513]		51,7	76,7
1810	550	[523]		52,3	77,0
1845	560	[532]		53,0	77,4
1880	570	[542]		53,6	77,8
1920	580	[551]		54,1	78,0
1955	590	[561]		54,7	78,4
1995	600	[570]		55,2	78,6
2030	610	[580]		55,7	78,9
2070	620	[589]		56,3	79,2
2105	630	[599]		56,8	79,5
2145	640	[608]		57,3	79,8
2180	650	[618]		57,8	80,0
	660			58,3	80,3
	670			58,8	80,6
	680			59,2	80,8
	690			59,7	81,1
	700			60,1	81,3
	720			61,0	81,8
	740			61,8	82,2
	760			62,5	82,6
	780			63,3	83,0
	800			64,0	83,4
	820			64,7	83,8
	840			65,3	84,1
	860			65,9	84,4
	880			66,4	84,7
	900			67,0	85,0
	920			67,5	85,3
	940			68,0	85,6

Numbers in brackets indicate hardness values, which are outside the definition area of the standard hardness test, but actually often used as approximate values. But the Brinell values in brackets are only used when measured with a hard metal ball.

1) Calculated as: HB = 0.95 HV

2) The tensile strength values shown in the table are only to be used as approximate values. To get the exact tensile strenght values a tensile test must be performed.

SI-Units

Measurement	SI-Units		Additional legal Units		Relationship between SI-Units	
Space and Time						
Length	m	(Meter)				
Area	m^2	(Square meter)	a ha	(Are) (Hectare)	1 a 1 ha	= 100 m^2 = 10'000 m^2
Volume	m^3	(Cubic meter)	l	(Liter)	1 l	= 1 dm^3
Time	s	(Second)	min	(Minute)	1 min	= 60 s
Frequency	Hz	(Hertz)	1/s		1 Hz	= 1/s
Velocity	m/s		km/h		1 km/h	= 0,2778 m/s
Mechanics						
Weight	kg	(Kilogram)	g t	(Gram) (Tonne)	1 t	= 1'000 kg
Force	N	(Newton)			1 N	= 1 kg m/s^2
Mech. Tension	N/m^2				1 N/mm2 1 MPa	= 1MPa = 10^6 Pa
Pressure	Pa	(Pascal)	bar mmHg	(Bar) (Millimeter Mercury)	1 Pa 1 bar 1 mmHg	= 1 N/m^2 = 10^5 Pa = 1,33322·10^2 Pa
Temperature						
Temperature	K	(Kelvin)	°C	(Degree centigrade)	Temp. [°C] = Temp. [K] -273,15 Temp. difference 1 °C = 1 K	

SI-Prefixes (decimal multipliers for SI units):

Factor	Symbol	Name
0.000'001 = 10^{-6}	µ	Micro
0.001 = 10^{-3}	m	Milli
0.01 = 10^{-2}	c	Centi
0.1 = 10^{-1}	d	Deci
1 = 10^0	–	–
10 = 10^1	da	Deca
100 = 10^2	h	Hecta
1'000 = 10^3	k	Kilo
1'000'000 = 10^6	M	Mega

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American and British Measure Units

Conversion of commonly used American (US) and British (UK) units to SI Units

Measurement	Name	Symbol	Conversion	
Length	inch	in	1 in	= 25,4 mm
Area	square inch	sq in (in^2)	1 sq in	= 6,4516 cm^2
Volume	cubic inch US gallon	cu in (in^3) US gal	1 cu in 1 US gal	= 16,3871 cm^3 = 3,785 dm^3
Weight	ounce pound	oz lb	1 oz 1 lb	= 28,3495 g = 0,453592 kg
Froce	pound-force ounce-force UK ton-force US ton-force	lbf ozf UK tonf US tonf	1 lbf 1 ozf 1 UK tonf 1 US tonf	= 0,44822 N = 0,278014 N = 9964,02 N = 8896.44 N
Pressure	pound-force per square inch	ibf/in^2, psi	1 lbf/in^2 = 1 psi	= 6,89476 kPa = 0,0689476 bar
Temperature	Degrees Fahrenheit	°F	°C	= (°F -32) · 5/9