



# EXPANSEUR PLUG EIS

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## PRESENTATION

### I. EIS PRESENTATION



SEDC INDUSTRIE has chosen a new partnership with the EIS Company, located in the USA and now owns the exclusive distribution of the EIS sealing plugs sales on the French territory.

The EIS Company is a manufacturer and a specialist in hydraulics sealing plugs in application fields such as hydraulics, automotive or aeronautics.

The company EIS is a fully integrated design and manufacturing company holding a Quality Management System Certificate complying with the requirements of ISO/TS 16949:2009 and is also RoHS compliant.

Through a high quality wide range, the EIS expanseurs sealing plugs are the high performance solution.

Thus, this new French & American partnership opens new horizons for the French plugging market.

The existing threaded plugs have now a serious competitor.

**Thanks to its fast installation and its very competitive price level, the EIS expanseur plug is the ideal alternative!**

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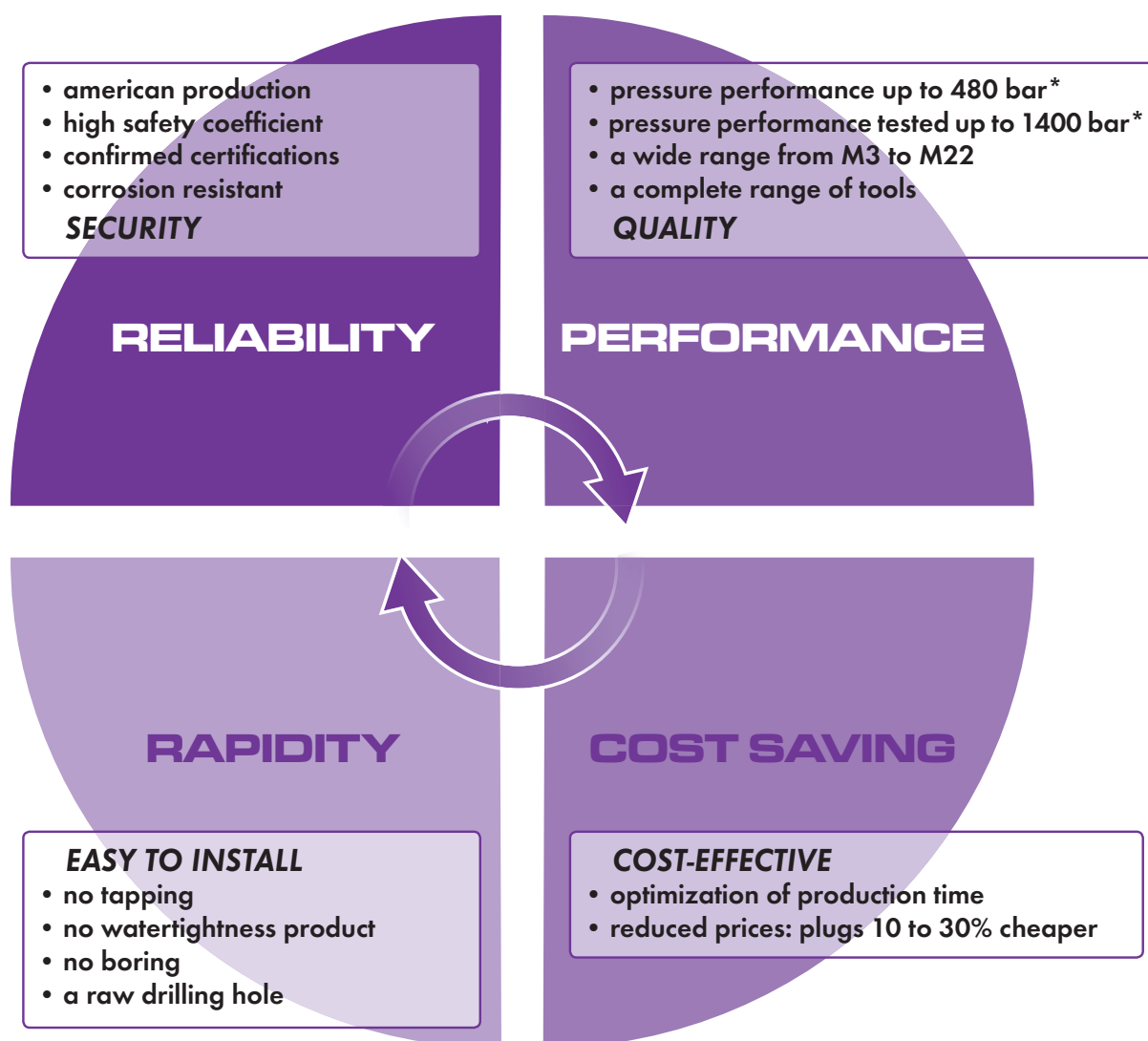


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## II. ADVANTAGES

The EIS expanseur plug is a one piece all metal assembly. It is used to permanently plug and seal auxiliary construction holes in pneumatic and hydraulic components and systems.

*The EIS expanseurs plugs are synonymous with :*



*\*see catalogue conditions*



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## III. PRINCIPLE

The mechanism is based on the expansion of the plugs into a raw drilling hole.

The EIS expanseurs plugs release the users from performing successive operations that are usually imposed (tapping, sticking, welding...).

## IV. RANGE

A wide range of plugs is available in order to meet customers' specifications in terms of sealing depending on the different criteria sustained (diameter, pressure, corrosion).

2 TYPES OF PLUGS	
<b>BALL PLUG</b> 	<b>MANDREL PLUG</b> 
ADAPTED TOOLS	
A specific range of tooling enables a proper installation of the plugs.	

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## V. APPLICATION FIELDS

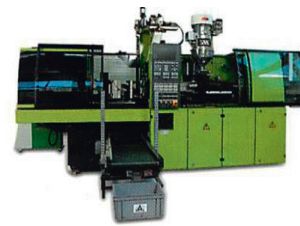
### Hydraulics & pneumatics

Sealing of drilled blocks  
Jacks & pumps manufacturing  
Building machines



### Machine-tool

Cooling systems  
Molds for injection moulding machines  
Bending machines, press...



### Automotive industry

Fuel injection systems  
ABS Break-Systems  
Engine and power transmission  
Steering control



### Aerospace field

Flight simulators  
Hydraulics gear  
Landing & control gear



### Elevator systems

Platforms  
Lifts



### Agricultural machines / Building industry

Tractor / articulated vehicles  
Mechanical shovel





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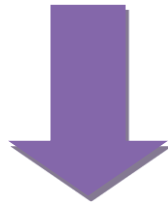
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## VI. INSTALLATION PROCESS

The EIS expanseurs plugs ensure sealing of auxiliary construction holes and pressure performance in compliance with the information given in the technical tables. Nevertheless, in order to achieve the announced results, **it is compulsory to respect all the installation conditions.**



Indeed, if one of the below criteria is not fulfilled, the indicated plugs' pressure performance won't be guaranteed.



RESPECT THE INSTALLATION PROCESS		
1	Drilling tolerance	See details in the following pages
2	Bore roughness	
3	Roundness tolerance	
4	Wall thickness / Distance from edge	

5	The hole has to be clear from oil, grease or chips.
6	Use the appropriate inserting tool



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## 1. DRILLING TOLERANCE

The drilling tolerance is : **0 to +0,1 mm**. This tolerance enables to guarantee the announced pressures.

See the technical table for more details.

## 2. BORE ROUGHNESS AND ANCHORAGE PRINCIPLE

The bore roughness of the sealing holes is directly related to the hardness and mechanical characteristics of the base material.

Depending on the combination of the plug and the base material, the anchorage will take place either by the groove profile of the sleeve biting into the base material or on the anchorage of the surface roughness of the bore.

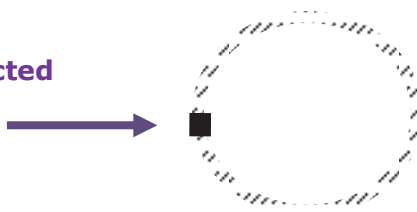


**The choice of an expandeur plug compels you to adjust the bore roughness depending on the hardness of the base material (see the technical table for each range)**

## 3. ROUNDNESS TOLERANCE

In order to ensure the proper functioning of the expandeur plug, in terms of pressure performance and watertightness, a roundness tolerance of :

**t = 0.05 mm has to be respected**



To do so, the use of a spiral drill is recommended.



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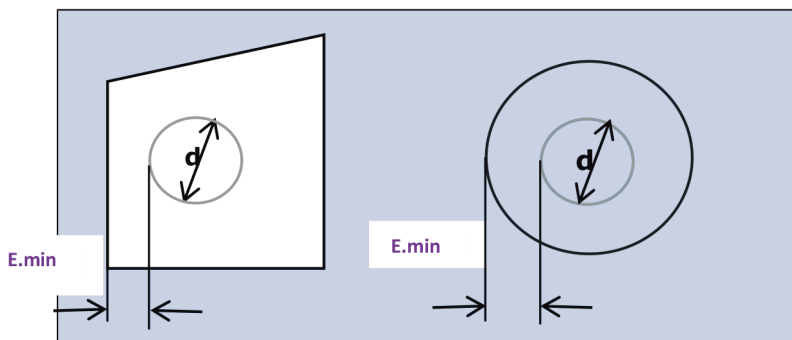
## 4. WALL THICKNESS / DISTANCE FROM EDGE

### 1. Principle

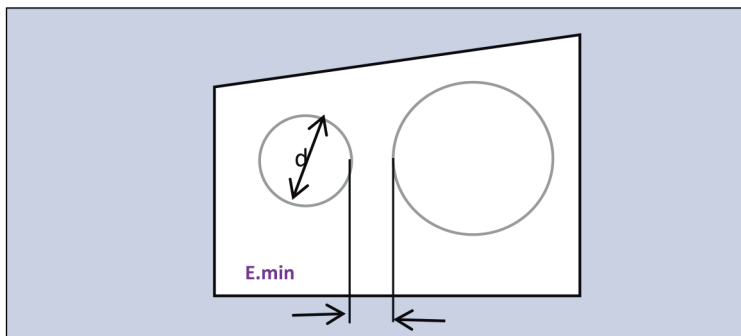
When the plug's sleeve expands, the base material distorts.

A minimum wall thickness **E.min** is then necessary:

- Between the sealing channel and the edge.



- Or between the sealing channel and another channel



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## 2. Calculation methods

Here below are the **calculation methods** to ascertain the minimal value **E.min** to be respected depending on the application.

**If the expandeur plug diameter  $d \geq 4$  mm :**

$$E.min = P. \times d$$

**If the expandeur plug diameter  $d < 4$  mm :**

$$E.min = P. \times d + 0,5mm$$

LEGEND OF THE TECHNICAL CRITERIA	
Minimum wall thickness to be respected	<b>E.min</b>
The base material and the expandeurs plugs range will determine the applicable <b>P factor</b>	<b>factor P.</b>
The plug diameter is requested to choose the calculation method	<b>d</b>

BASE MATERIAL							
Expandeur plug	ETG-100	C15 Pb	EN-GJL-250	EN-GJS-500-7	AlCu4Mg1	AlMgSiPb	G-AISi7Mg
	P. Factor						
33	0.6	0.8	1.0	0.8	0.8	1.0	1.0
31	0.6	0.8	1.0	0.8	0.8	1.0	1.0
11	0.5	0.6	1.0	0.6	0.6	1.0	1.0
RS	0.5	0.6	1.0	0.6	0.6	1.0	1.0



Under the given values, there is a risk of overloading the base material which can affect the expandeur plug performance. For such issues, tests have to be carried out.



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## BALL PLUG RANGE

### I. INTRODUCTION

Our expanseurs ball plugs range is intended to be used in base materials of both low to high hardness, for high pressure environments up to 480 bar.

The EIS expanseurs ball plugs are made of two components which are assembled beforehand :

① **A ball** fitted into the sleeve.

② **An expansion sleeve** with circular grooves on the external side.

①

②



The insertion of the plug has to be made in a counterbored hole. The ball is pressed into the sleeve so that the top of the ball is slightly below the top of the sleeve, and allows expansion of the sleeve.

### II. RANGE

The range is composed of three types of ball plugs, made of several materials and surface treatments.

RANGE	DIAMETER	MATERIAL	
		PLUG	BALL
33	3 to 22	Stainless Steel	Stainless Steel
31	3 to 22	Stainless Steel	Bearing Steel heat treated
11	3 to 22	Case Hardening Steel Commercial zinc	Bearing Steel heat treated

Other materials and dimensions such as inch sizes are available and can be provided upon request.



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## III. TECHNICAL PERFORMANCES

### 1. PRESSURE PERFORMANCE

The below tables establish the different pressure performances of the EIS plug, depending on the base material and the plug diameter

BASE MATERIAL	EIS-11 : Case hardening Steel, commercial zinc Sleeve Bearing Steel, Heat treated Ball													
	3	4	5	6	7	8	9	10	12	14	16	18	20	22
ETG-100														
C15 Pb														
EN-GJL-250														
EN-GJS-500-7														
AlCu4Mg1														
AlMgSiPb														
G-AISI7Mg														

BASE MATERIAL	EIS-33 : Stainless steel 303 plug and 316 Ball EIS-31 : Stainless steel 303 sleeve Bearing steel heat treated Ball													
	3	4	5	6	7	8	9	10	12	14	16	18	20	22
ETG-100														
C15 Pb														
EN-GJL-250														
EN-GJS-500-7														
AlCu4Mg1														
AlMgSiPb														
G-AISI7Mg														

#### LEGEND

**Proof Pressure test**

**Max. allowable Working Pressure = Nominal Pressure**

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## 2. BORE ROUGHNESS AND ANCHORAGE PRINCIPLE

The bore roughness must always be adjusted according to the hardness of the base material. The anchorage will take place either by the groove profile of the sleeve biting into the base material or on the anchorage of the surface roughness of the bore.

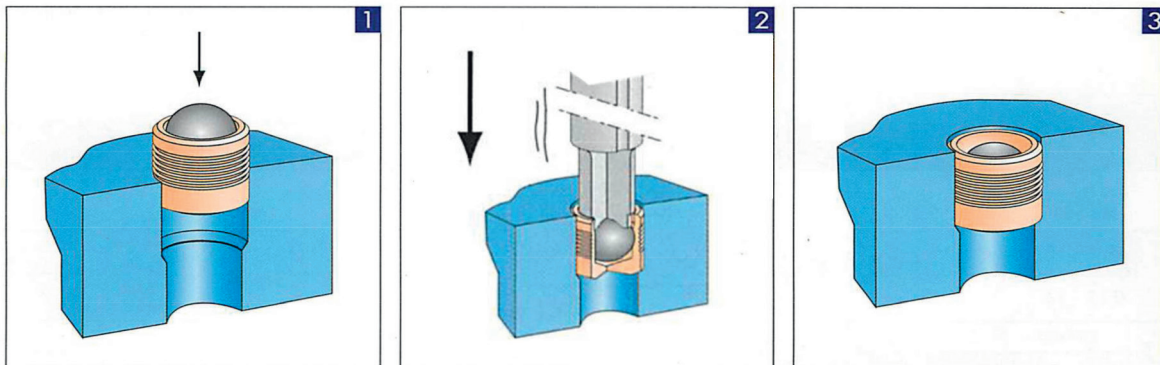
BASE MATERIAL	EIS-11/33/31													
	3	4	5	6	7	8	9	10	12	14	16	18	20	22
ETG-100	<b>Rz 10-30 µm</b>													
C15 Pb	<b>Drilling Tolerance : 0 / +0.1</b>													
EN-GJL-250	<b>Anchorage into base material</b> <b>Drilling Tolerance : 0 / +0.1</b>													
EN-GJS-500-7														
AlCu4Mg1														
AlMgSiPb														
G-AISI7Mg														



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## IV. INSTALLATION INSTRUCTIONS



### Insertion :

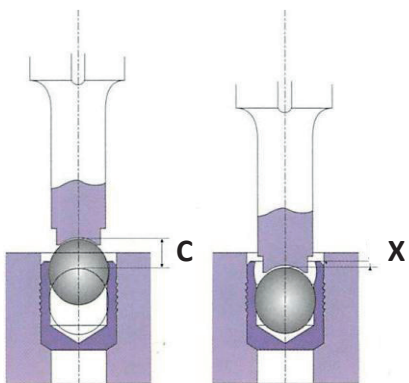
Insert the expanseur plug, ball to the top, in the designed shoulder.

### Fastening :

Push in the ball by using the setting tool with the help of a hammer or a press.

### Compulsory control

The ball has to be located at a X distance under the expanseur plug top.  
(see table below)



The ball driving in setting is important as it guarantees a proper anchorage of the plug into the base material. It is essential to follow the instructions listed below. (for a press installation, limit the low stroke point).

Ø Expanseur plug		3	4	5	6	7	8	9	10	12	14	16	18	20	22
<b>C</b> (mm)	<b>Ball driving in stroke</b>	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
<b>X</b> + - <b>0,2</b> (mm)	<b>Top of the ball position compared with the upper side of the sleeve</b>	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



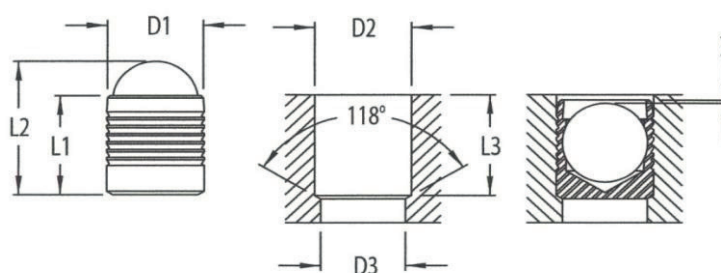
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## V. BALL PLUGS TECHNICAL DATA SHEET

EIS 33 ALL STAINLESS STEEL RANGE	
Sleeve	Ball
Stainless Steel 303	Stainless Steel 316



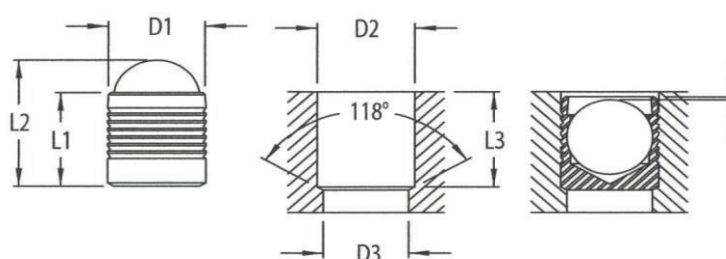
DESIGNATION	ITEM NUMBER	D1	L1	L2	D2 + 0.1 + 0	D3 max.	L3 min.	X +/- 0,2	Minimum order quantity
EIS 33-030	560 33 030 000	3,0	3,6	4,6	3,0	2,2	3,4	0,4	100
EIS 33-040	560 33 040 000	4,0	4,0	5,2	4,0	3,3	3,8	0,2	100
EIS 33-050	560 33 050 000	5,0	5,5	7,1	5,0	4,3	5,3	0,4	100
EIS 33-060	560 33 060 000	6,0	6,5	8,7	6,0	5,3	6,3	0,4	100
EIS 33-070	560 33 070 000	7,0	7,5	10,2	7,0	6,4	7,3	0,4	100
EIS 33-080	560 33 080 000	8,0	8,5	11,6	8,0	7,4	8,3	0,3	50
EIS 33-090	560 33 090 000	9,0	10,0	13,6	9,0	8,4	9,8	0,4	50
EIS 33-100	560 33 100 000	10,0	11,0	15,2	10,0	9,4	10,8	0,4	50
EIS 33-120	560 33 120 000	12,0	13,0	17,9	12,0	10,6	12,8	0,4	25
EIS 33-140	560 33 140 000	14,0	15,0	20,6	14,0	12,7	14,5	0,4	25
EIS 33-160	560 33 160 000	16,0	17,0	23,4	16,0	14,7	16,5	0,6	25
EIS 33-180	560 33 180 000	18,0	19,0	26,4	18,0	16,7	18,5	0,6	25
EIS 33-200	560 33 200 000	20,0	22,0	30,1	20,0	18,7	21,5	0,8	25
EIS 33-220	560 33 220 000	22,0	25,0	34,0	22,0	20,7	24,5	0,8	25



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EIS 31 STAINLESS STEEL RANGE	
Sleeve	Ball
Stainless Steel 303	Bearing Steel, heat treated



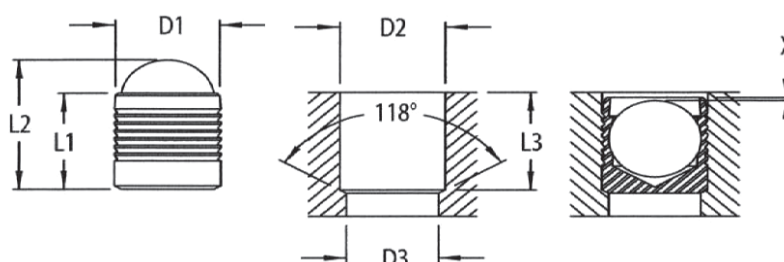
DESIGNATION	ITEM NUMBER	D1	L1	L2	D2 + 0.1 + 0	D3 max.	L3 min.	X +/- 0,2	Minimum order quantity
EIS 31-030	560 31 030 000	3,0	3,6	4,6	3,0	2,2	3,4	0,4	100
EIS 31-040	560 31 040 000	4,0	4,0	5,2	4,0	3,3	3,8	0,2	100
EIS 31-050	560 31 050 000	5,0	5,5	7,1	5,0	4,3	5,3	0,4	100
EIS 31-060	560 31 060 000	6,0	6,5	8,7	6,0	5,3	6,3	0,4	100
EIS 31-070	560 31 070 000	7,0	7,5	10,2	7,0	6,4	7,3	0,4	100
EIS 31-080	560 31 080 000	8,0	8,5	11,6	8,0	7,4	8,3	0,3	50
EIS 31-090	560 31 090 000	9,0	10,0	13,6	9,0	8,4	9,8	0,4	50
EIS 31-100	560 31 100 000	10,0	11,0	15,2	10,0	9,4	10,8	0,4	50
EIS 31-120	560 31 120 000	12,0	13,0	17,9	12,0	10,6	12,8	0,4	50
EIS 31-140	560 31 140 000	14,0	15,0	20,6	14,0	12,7	14,5	0,4	50
EIS 31-160	560 31 160 000	16,0	17,0	23,4	16,0	14,7	16,5	0,6	25
EIS 31-180	560 31 180 000	18,0	19,0	26,4	18,0	16,7	18,5	0,6	25
EIS 31-200	560 31 200 000	20,0	22,0	30,1	20,0	18,7	21,5	0,8	25
EIS 31-220	560 31 220 000	22,0	25,0	34,0	22,0	20,7	24,5	0,8	25

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EIS 11 ALL STEEL RANGE	
Sleeve	Ball
Case Hardening Steel, commercial zinc	Bearing Steel, heat treated



DESIGNATION	ITEM NUMBER	D1	L1	L2	D2 + 0.1 + 0	D3 max.	L3 min.	X +/- 0,2	Minimum order quantity
EIS 11-030	560 11 030 000	3,0	3,6	4,6	3,0	2,2	3,4	0,4	100
EIS 11-040	560 11 040 000	4,0	4,0	5,2	4,0	3,3	3,8	0,2	100
EIS 11-050	560 11 050 000	5,0	5,5	7,1	5,0	4,3	5,3	0,4	100
EIS 11-060	560 11 060 000	6,0	6,5	8,7	6,0	5,3	6,3	0,4	100
EIS 11-070	560 11 070 000	7,0	7,5	10,2	7,0	6,4	7,3	0,4	100
EIS 11-080	560 11 080 000	8,0	8,5	11,6	8,0	7,4	8,3	0,3	50
EIS 11-090	560 11 090 000	9,0	10,0	13,6	9,0	8,4	9,8	0,4	50
EIS 11-100	560 11 100 000	10,0	11,0	15,2	10,0	9,4	10,8	0,4	50
EIS 11-120	560 11 120 000	12,0	13,0	17,9	12,0	10,6	12,8	0,4	50
EIS 11-140	560 11 140 000	14,0	15,0	20,6	14,0	12,7	14,5	0,4	50
EIS 11-160	560 11 160 000	16,0	17,0	23,4	16,0	14,7	16,5	0,6	25
EIS 11-180	560 11 180 000	18,0	19,0	26,4	18,0	16,7	18,5	0,6	25
EIS 11-200	560 11 200 000	20,0	22,0	30,1	20,0	18,7	21,5	0,8	25
EIS 11-220	560 11 220 000	22,0	25,0	34,0	22,0	20,7	24,5	0,8	25



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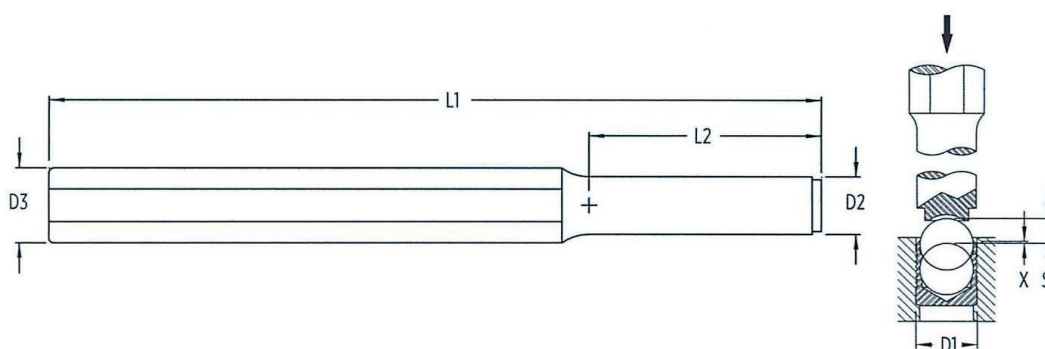
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## VI. TOOL TECHNICAL DATA SHEET

### HT SETTING TOOL FOR THE BALL PLUG RANGE

#### HAND OR MECHANICAL INSTALLATION

Essential for the installation of the expansion ball plugs, our HT setting tools range guarantees a proper insertion of the plugs. Indeed, its rounded shape follows the ball in order to avoid any risk of crushing during the driving in effort.



DESIGNATION	ITEM NUMBER	D1	D3	L1	D2	L2	X +/- 0,2
Setting tool HT 030	565 030 000 00	3,0	10	100	2,8	10,0	0,4
Setting tool HT 040	565 040 000 00	4,0	10	100	3,8	10,0	0,2
Setting tool HT 050	565 050 000 00	5,0	10	100	4,7	12,0	0,4
Setting tool HT 060	565 060 000 00	6,0	10	100	5,8	15,0	0,4
Setting tool HT 070	565 070 000 00	7,0	10	100	6,8	18,0	0,4
Setting tool HT 080	565 080 000 00	8,0	10	100	7,8	20,0	0,3
Setting tool HT 090	565 090 000 00	9,0	16	100	8,7	22,0	0,4
Setting tool HT 100	565 100 000 00	10,0	16	100	9,8	25,0	0,4
Setting tool HT 120	565 120 000 00	12,0	16	150	11,7	30,0	0,4
Setting tool HT 140	565 140 000 00	14,0	19	150	13,7	35,0	0,4
Setting tool HT 160	565 160 000 00	16,0	19	150	15,7	40,0	0,6
Setting tool HT 180	565 180 000 00	18,0	19	150	17,7	45,0	0,6
Setting tool HT 200	565 200 000 00	20,0	25	150	19,7	50,0	0,8
Setting tool HT 220	565 220 000 00	22,0	25	150	21,7	55,0	0,8

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## MANDREL PLUG RANGE

### I. INTRODUCTION

Especially intended to low hardness base materials, the mandrel plugs are adapted to high pressure environments up to 480 bar. The main advantage of this range is the possibility of an automatic fast installation for medium and large series.

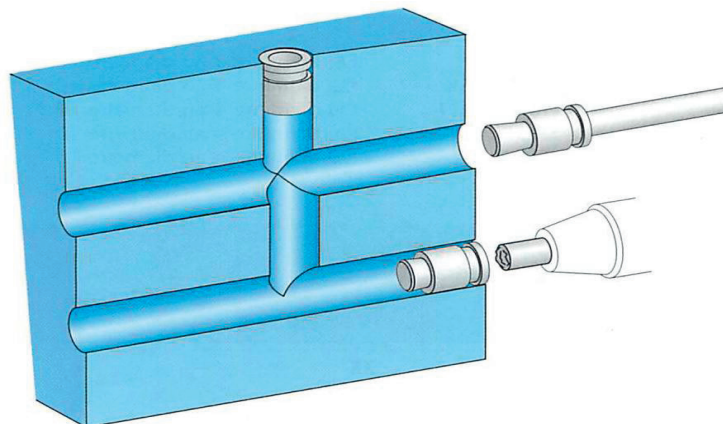
The mandrel expanseurs plugs are made of two components:

① **An expansive mandrel** made of treated steel, with a cone shaped head, a round and ridged tail, with a breaking groove (under the sleeve).

② **An expansive sleeve** made of steel.

By using the appropriate tool, whilst maintaining the sleeve in the sealing hole, we exert an axial tensile strength on the plug's mandrel. The cone shaped part of the mandrel expands the sleeve which anchors into the rough drilling surface.

The increase of the tensile strength effort triggers off the sleeve's locking. Once the tensile strength is achieved (this is determined by the breaking groove), the mandrel breaks off automatically. The hole is expanded by the sleeve.



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## II. RANGE

Our standard range is the RS range and it covers diameters 4 to 10.

Upon request, the RSL plug with long length mandrel range is available. It is especially adapted for difficult accessibilities.

RANGE	DIAMETER	MATERIAL	
		SLEEVE	MANDREL
RS	4 to 10	Case hardening Steel, Black Oxide Finish	Heat treatable Steel, Black Oxide Finish

## III. PRESSURE PERFORMANCE

The below table establishes the different pressure performances of the RS mandrel plug, depending on the base material and the plug diameter. It also gives information on the hardness and the mechanical characteristics of the base material.

The bore roughness must always be adjusted according to the hardness of the base material. The anchorage will take place either by the groove profile of the RS sleeve biting into the base material or on anchorage to the surface roughness of the bore.

BASE MATERIAL	RS RANGE													
	4	5	6	7	8	9	10	4	5	6	7	8	9	10
ETG-100	<p><b>1585 bar</b></p> <p><b>480 bar</b></p> <p><b>1380 bar</b></p> <p><b>445 bar</b></p>							<p><b>Rz 10 – 30 µm</b></p> <p>Drilling tolerance : +0 +0.12</p>						
C15 Pb								<p><b>Anchorage into base material</b></p> <p>Drilling tolerance : +0 +0.12</p>						
EN-GJL-250														
EN-GJS-500-7														
AlCu4Mg1														
AlMgSiPb														
G-AISi7Mg														

### LEGEND

**Proof Pressure test**

**Max. allowable Working Pressure = Nominal Pressure**

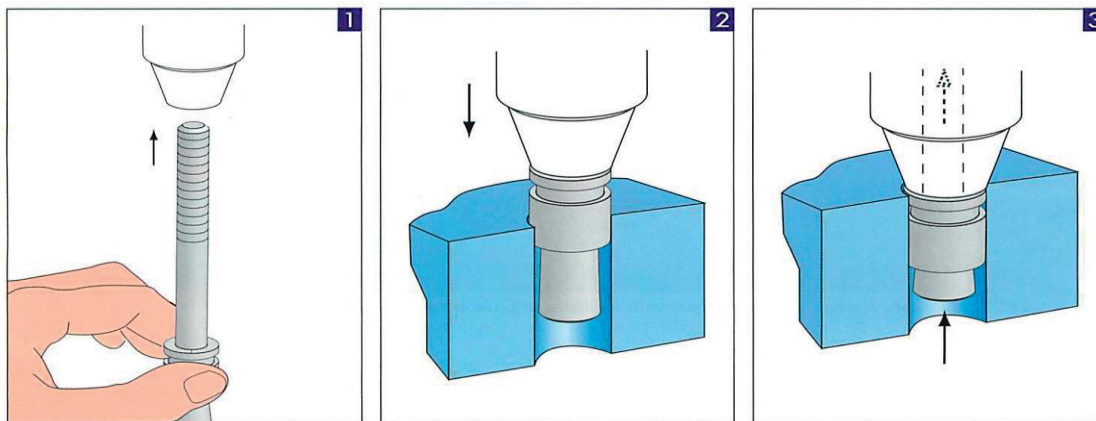




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## IV. INSTALLATION INSTRUCTIONS



### Insertion in the tool :

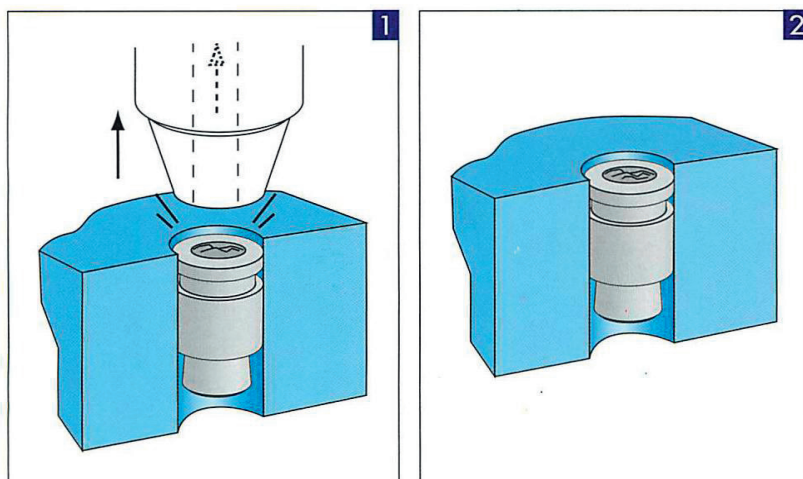
Put the plug in the appropriate hand or pneumatic tool.

### Installation of the plug :

Insert the plug by using the tool in the sealing hole.

### Expansion of the sleeve :

Pull of the tool's trigger so that the sleeve can expand.



### Mandrel's breaking off :

The mandrel breaks off automatically once the requested pulling is reached (this is determined by the breaking groove).

### The mandrel plug is inserted :

The hole is sealed.



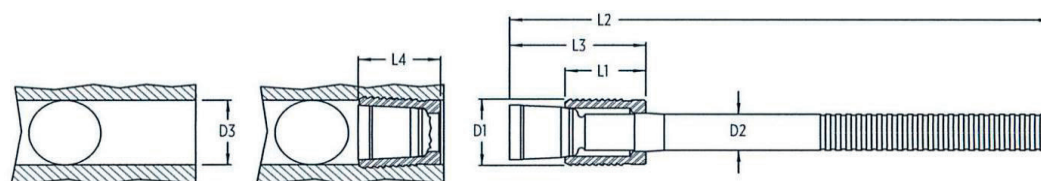
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## V. TECHNICAL DATA SHEET MANDREL PLUG

RS MANDREL PLUG RANGE	
Sleeve	Mandrel
Case hardening Steel, Black Oxide Finish	Heat treatable Steel, Black Oxide Finish



DESIGNATION	ITEM NUMBER	D1	L1	D2	L2	L3 max.	L4 max.	D3+0.12 /-0.0	Minimum order quantity
<b>EIS RS-040</b>	560 RS 040 000	4,0	4,5	2,5	39	9	6,5	4,0	100
<b>EIS RS-050</b>	560 RS 050 000	5,0	5,5	3,0	41	10	7,5	5,0	100
<b>EIS RS-060</b>	560 RS 060 000	6,0	6,5	3,4	43	12	8,0	6,0	100
<b>EIS RS-070</b>	560 RS 070 000	7,0	7,5	4,1	38	14	9,0	7,0	100
<b>EIS RS-080</b>	560 RS 080 000	8,0	8,5	4,2	40	15	10,5	8,0	100
<b>EIS RS-090</b>	560 RS 090 000	9,0	9,5	4,5	43	17	11,0	9,0	100
<b>EIS RS-100</b>	560 RS 100 000	10,0	10,5	4,75	45	19	12,5	10,0	100

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## VI. TOOL TECHNICAL DATA SHEET

### PNEUMATIC INSERT TOOL RS MANDREL RANGE

The pneumatic insert tool is adapted to the installation of the RS range mandrel plugs.

It is available in two versions:

DIAMETER	ITEM NUMBER
4 to 6	5694600000
7 to 10	5697100000



Ø PLUG	ITEM NUMBER	
	Nose piece	Jaws
4	5670400000	5680400000
5	5670500000	5680500000
6	5670600000	5680600000
7	5670700000	5680700000
8	5670800000	5680800000
9	5670900000	5680900000
10	5671000000	5681000000

*Jaw case and jaw pusher are available upon request*





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