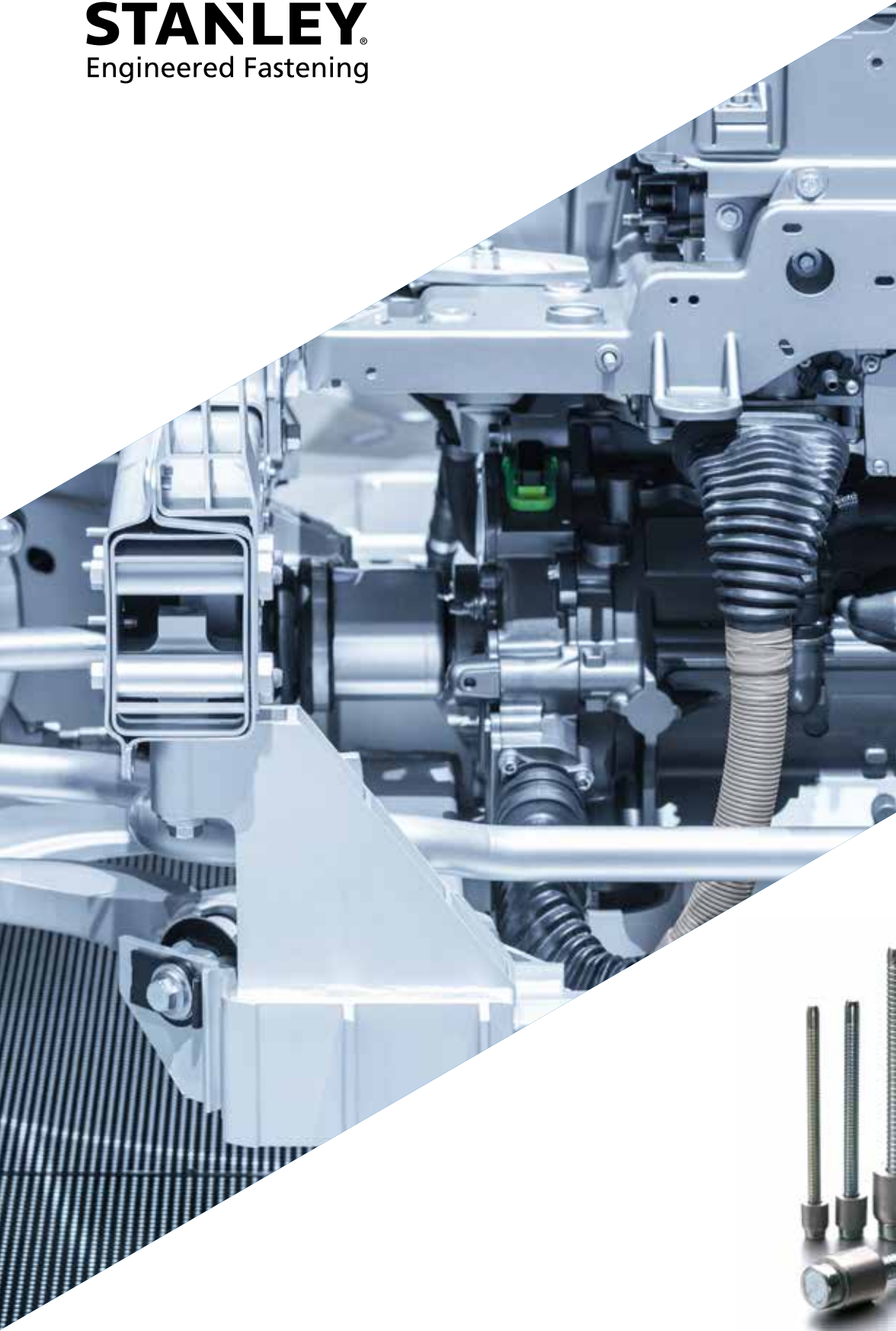


**STANLEY**  
Engineered Fastening



Sealing Products

**AVDEL**



Stanley® Engineered Fastening is committed to helping our customers improve production efficiency and reduce defect levels by delivering solutions tailored to customer application requirements and production ergonomics.

### **Avseal®**

#### **The original breakstem sealing plug.**

Proven and reliable fluid sealing system from Avdel® with hundreds of millions of plugs installed globally in automotive and industrial applications.

### **Avseal XT®**

#### **Ultra-high pressure breakstem sealing plug.**

A novel sealing system from Avdel offering rapid and cost-effective sealing of high-pressure hydraulic applications.







# Avseal

## The original breakstem sealing plug

The Avseal range of plugs is unique in the efficient performance provided in hole sealing applications. The rapidly installed two-piece plug offers technical characteristics that:

- Greatly improve quality and safety in demanding applications
- Simplify hole preparation and the installation process
- Offers an excellent price-performance ratio



### Product performance

- Fully annealed aluminium sleeve for high-performance sealing at working pressures up to 300 bar (4,350 lb/in<sup>2</sup>) depending on the application.
- Reliable sealing over a wide temperature range.
- Stringent quality controls of material and process throughout production.
- Air-leak testing of every production batch to verify sealing integrity.
- Plugs plain drilled holes with no special preparation – no thread-cutting or reaming required.
- Unique hole-filling capability for improved sealing action and wider hole tolerances.
- Larger hole size tolerance simplifies alignment when automated or robotic placing equipment is used.
- Internal lock of the remaining stem in the installed sleeve provides robust plugging of holes with high vibration resistance.
- Shorter placed length, reduced blind side protrusion for use in restricted depth holes.
- Low force special Avseal versions are ideal for thin-walled, lightweight castings.
- Custom designs can be developed to suit specific applications.
- Technical cleanliness in accordance with VDA and other customer specifications also available.





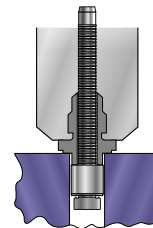
### Setting process

- Sleeve compression via consistent breakstem load ensures repeatable sealing with no tool settings involved.
- No special skills required of operators to install Avseal plugs.
- Tapered sleeve and stem ends ease both entry into application and tool nose tip for better operator ergonomics, and also make Avseal suitable for automated feeding systems.
- Set all Avseal products using Stanley Assembly Technologies hydro-pneumatic and battery-powered breakstem riveting tools.
- Process monitoring is readily implemented using stem breakload to help verify sealing.

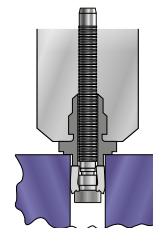


### Placing sequence

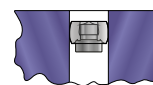
1. Insert stem into the tool nose.



2. Insert the Avseal plug fully inside the application hole so the tool nose contacts the application.



3. Press tool trigger to install the Avseal plug. The stem breaks off at a predetermined force. The sleeve expands barrel-shaped and gently seals against the wall of the bore.



This simple installation sequence is equally applicable to manual placing tools (pneumatic or battery powered) or fully automated systems.

# Avseal

## 02961 Series

Capable of withstanding blow-out pressures of 900 bar.

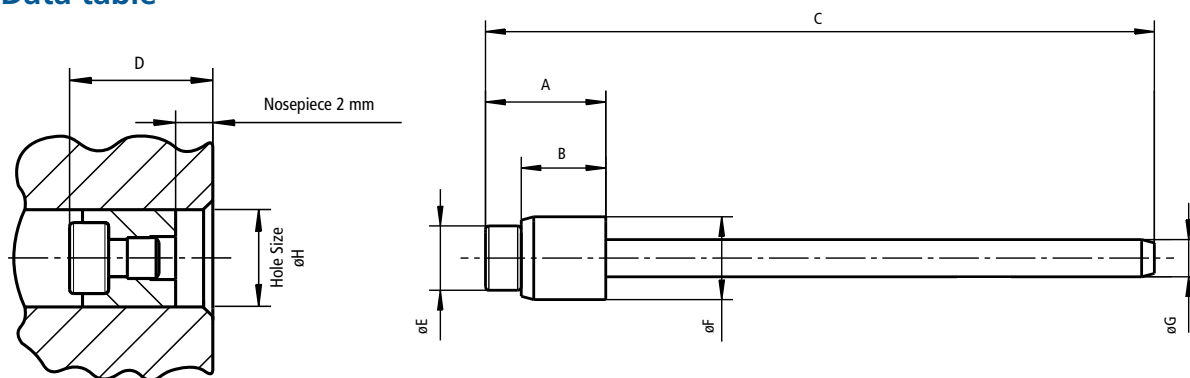
Typical working pressures up to 300 bar.

### Material

Sleeve: Aluminium alloy (6061), annealed.

Stem: Medium carbon steel, hardened and tempered.  
Zinc plated, clear trivalent passivated.

### Data table



Installed plug depth  
with 2mm nose tip extension

Hole surface finish  
Rz = min. 5.0 - max 25.0 µm

| Ø  | Part Number | øF        | øG        | øE        | Hole Size øH |           | B         | C         | A         | D max. (mm)                                       |
|----|-------------|-----------|-----------|-----------|--------------|-----------|-----------|-----------|-----------|---------------------------------------------------|
|    |             | Max. (mm) | Ref. (mm) | Ref. (mm) | Min. (mm)    | Max. (mm) | Max. (mm) | Max. (mm) | Max. (mm) | Max. depth of installed Avseal plug Nosepiece 2mm |
| 4  | 02961-00405 | 3.9       | 1.9       | 3.0       | 3.9          | 4.3       | 4.1       | 41.4      | 6.5       | 6.3                                               |
| 5  | 02961-00506 | 4.9       | 2.2       | 3.8       | 5.0          | 5.4       | 5.0       | 42.2      | 7.2       | 7.7                                               |
| 6  | 02961-00607 | 5.9       | 2.6       | 4.5       | 6.0          | 6.4       | 6.0       | 50.1      | 8.6       | 10.3                                              |
| 7  | 02961-00708 | 6.8       | 3.0       | 5.4       | 7.0          | 7.4       | 6.9       | 51.1      | 9.8       | 11.2                                              |
| 8  | 02961-00810 | 7.8       | 3.6       | 6.1       | 7.8          | 8.4       | 7.9       | 51.9      | 11.1      | 11.5                                              |
| 9  | 02961-00911 | 8.8       | 3.9       | 6.9       | 8.8          | 9.8       | 8.5       | 53.0      | 12.7      | 11.9                                              |
| 10 | 02961-01012 | 9.8       | 4.4       | 7.8       | 9.8          | 10.8      | 10.0      | 53.4      | 14.0      | 15.0                                              |
| 12 | 02961-01215 | 11.8      | 5.3       | 9.4       | 11.8         | 12.8      | 11.5      | 62.8      | 15.8      | 16.6                                              |

### Ideal applications

#### Industrial

- Fluid handling
- Pneumatic systems
- Hydraulic blocks
- Compressors
- Refrigeration
- Pumps
- Holes with large tolerance



# Avseal

## 02964 Series

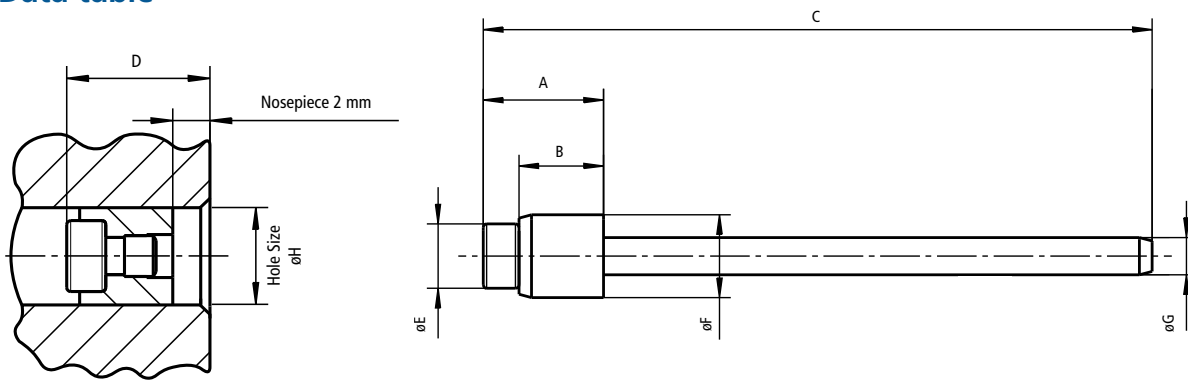
Dependable sealing of coolants and oils in thin walled and lightweight applications.

### Material

Sleeve: Aluminium alloy (6061), annealed.

Stem: Medium carbon steel, hardened and tempered.  
Zinc plated, clear trivalent passivated.

### Data table



Installed plug depth  
with 2mm nose tip extension

Hole surface finish  
Rz = min. 5.0 - max 25.0  $\mu\text{m}$

| $\varnothing$ | Part Number | $\varnothing F$ | $\varnothing G$ | $\varnothing E$ | Hole Size $\varnothing H$ |           | B         | C         | A         | D max. (mm)                                       |
|---------------|-------------|-----------------|-----------------|-----------------|---------------------------|-----------|-----------|-----------|-----------|---------------------------------------------------|
|               |             | Max. (mm)       | Ref. (mm)       | Ref. (mm)       | Min. (mm)                 | Max. (mm) | Max. (mm) | Max. (mm) | Max. (mm) | Max. depth of installed Avseal plug Nosepiece 2mm |
| 9             | 02964-00911 | 8.8             | 3.6             | 6.1             | 9.0                       | 9.4       | 8.5       | 51.8      | 11.7      | 12.6                                              |
| 10            | 02964-01012 | 9.8             | 3.9             | 7.0             | 10.0                      | 10.4      | 9.5       | 52.6      | 13.1      | 13.5                                              |
| 11            | 02964-01113 | 10.8            | 4.4             | 7.8             | 11.0                      | 11.4      | 9.8       | 53.4      | 13.7      | 14.1                                              |
| 12            | 02964-01215 | 11.8            | 4.4             | 7.8             | 12.0                      | 12.4      | 9.5       | 53.4      | 13.4      | 14.0                                              |
| 13            | 02964-01315 | 12.8            | 4.8             | 8.6             | 13.0                      | 13.4      | 10.3      | 62.0      | 14.7      | 14.5                                              |
| 14            | 02964-01415 | 13.8            | 5.3             | 9.4             | 14.0                      | 14.4      | 11.0      | 62.8      | 15.7      | 15.9                                              |
| 16            | 02964-01620 | 15.8            | 6.0             | 11.0            | 16.0                      | 16.4      | 12.6      | 64.8      | 18.0      | 18.0                                              |

### Ideal applications

#### Automotive

- Engine blocks
- Transmissions
- Cylinders
- Brakes
- Clutch
- Gearbox

#### Industrial

- Fluid handling
- Pneumatic systems
- Refrigeration
- Restricted space
- Shorter hole length





# Avseal XT

## Ultra-high pressure breakstem sealing plug

**Avseal XT blind breakstem plugs are installed into plain drilled cross holes in hydraulic manifolds and valve blocks to provide a permanent metal seal capable of withstanding blow-out pressures of 1,600 bar.**

### How it works

Unique new patent-pending design optimises the expansion of the aluminium sleeve progressively to seal the hole as the stem is pulled by the placing tool fitted with special nose tip.

Huge radial pressures acting on the aluminium sleeve engage it into the microscopic grooves of the drilled hole to grip the surface to ensure a high-integrity all-metal seal.

Unique steel stem profile locks into the centre of the sleeve and breaks off sub-flush at a pre-determined load for consistent and reliable placing with no tool settings needed. Consistent depth of installation is achieved by nose tip length.

### Product performance

- High tensile steel stem and aluminium sleeve provide extreme sealing capability. Tested at proof oil pressures of over 1,600 bar (23,200 lb/in<sup>2</sup>).
- Intended for hydraulic applications with cyclic working pressures up to 500 bar (7,250 lb/in<sup>2</sup>).
- Stringent quality controls of material and process throughout production.
- Air-leak testing of every production batch to verify sealing integrity.
- Plugs plain drilled holes with no special preparation – no thread-cutting or reaming required.
- Sleeve radial expansion is driven by high breakstem load to ensure reliable sealing with no tool settings involved.
- Rounded stem head is larger than sleeve so protecting it from accidental damage during insertion. Stem head form also provides guidance into the closer fitting application hole sizes - either with manual or automated placing tooling.



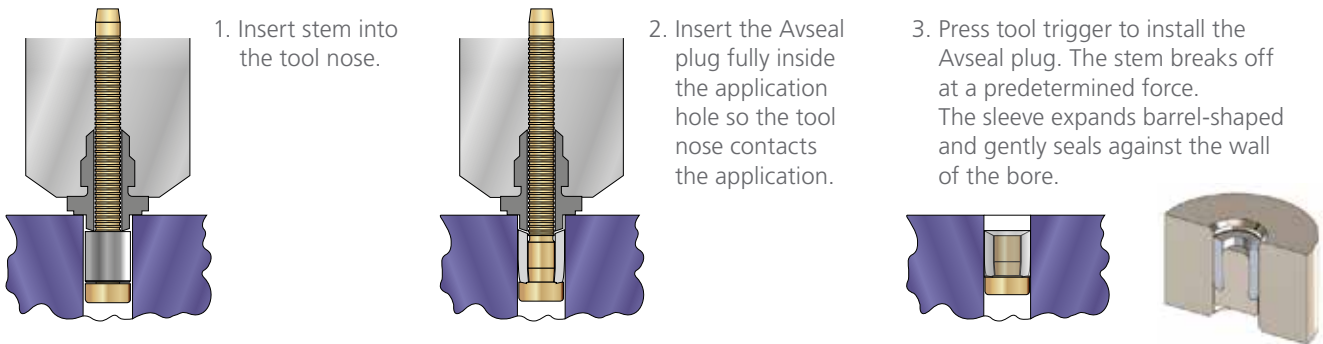


## Setting process

- Installed with Stanley Assembly Technologies range of standard hydro-pneumatic and battery powered riveting tools.
- No special skills required of operators to install Avseal XT plugs.
- Internal tapered stem locks into installed sleeve rigidly to provide robust plugging of holes with high vibration resistance.



## Placing sequence



This simple installation sequence is equally applicable to manual placing tools (pneumatic or battery powered) or fully automated systems.



# Avseal XT

## 02931 Series

Efficient hole sealing performance for ultra high pressure hydraulic applications. Capable of withstanding blow-out pressures of 1600 bar. For working pressures up to 500 bar.

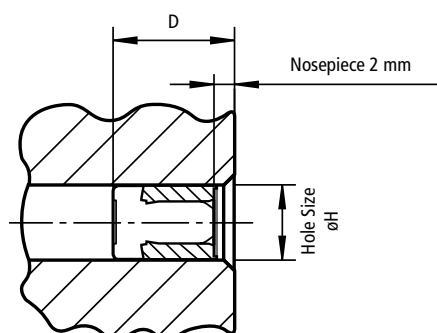
### Material

Sleeve: Aluminium alloy (6061), annealed.

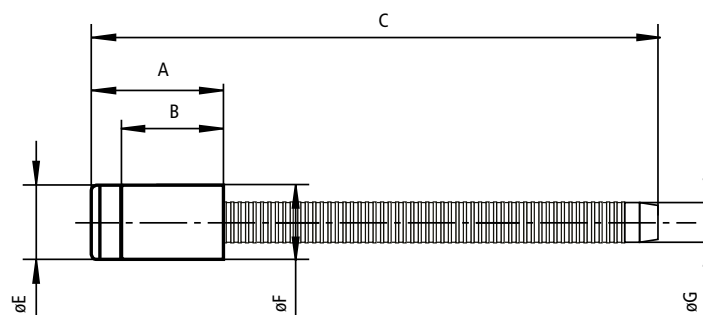
Stem: Medium carbon steel, hardened and tempered.  
Zinc plated, yellow trivalent passivated.



### Data table



Installed plug depth with 2mm nose tip extension



Hole surface Roughness Rz 10-30µm

| Ø  | Part Number | øF        | øG        | øE        | Hole Size øH |           | B         | C         | A         | D max. (mm)                                       |
|----|-------------|-----------|-----------|-----------|--------------|-----------|-----------|-----------|-----------|---------------------------------------------------|
|    |             | Max. (mm) | Ref. (mm) | Max. (mm) | Min. (mm)    | Max. (mm) | Ref. (mm) | Ref. (mm) | Max. (mm) | Max. depth of installed Avseal plug Nosepiece 2mm |
| 5  | 02931-00507 | 4.85      | 2.7       | 4.95      | 5.00         | 5.12      | 7.7       | 50.2      | 10.8      | 10.5                                              |
| 6  | 02931-00608 | 5.85      | 3.1       | 5.95      | 6.00         | 6.12      | 8.2       | 51.7      | 11.7      | 11.4                                              |
| 7  | 02931-00709 | 6.80      | 3.6       | 6.90      | 7.00         | 7.12      | 9.3       | 53.0      | 13.3      | 13.3                                              |
| 8  | 02931-00811 | 7.80      | 4.4       | 7.90      | 8.00         | 8.12      | 10.5      | 54.6      | 14.7      | 14.4                                              |
| 10 | 02931-01013 | 9.80      | 5.3       | 9.90      | 10.00        | 10.12     | 12.7      | 64.7      | 17.7      | 17.5                                              |

### Ideal applications

- High pressure applications
- Agriculture / Ground works
- High pressure hydraulics
- Oil & gas



## Installation tool selection guide

The Avseal range of blind sealing plugs can be installed with the current selection of structural hand tools and automated placing equipment.

The tapered end of the plug's stem ensures it is easy to feed into the tooling equipment, while the taper on the sleeve allows ease of entry into an application.

### Hand tools



**Proset XT2**

|            |                           |
|------------|---------------------------|
| Stroke     | 20 mm                     |
| Pull Force | 8.9 kN                    |
| Capacity   | 4.0 - 7.0mm sealing plugs |
| Weight     | 1.26 kg                   |



**Proset XT3**

|            |                            |
|------------|----------------------------|
| Stroke     | 26 mm                      |
| Pull Force | 17 kN                      |
| Capacity   | 6.0 - 10.0mm sealing plugs |
| Weight     | 2.14 kg                    |



**Proset XT4**

|            |                            |
|------------|----------------------------|
| Stroke     | 18 mm                      |
| Pull Force | 23 kN                      |
| Capacity   | 6.0 - 12.0mm sealing plugs |
| Weight     | 2.16 kg                    |



**7287**

|            |                                |
|------------|--------------------------------|
| Stroke     | 32 mm                          |
| Pull Force | 32.4 kN                        |
| Capacity   | 10.0 - 14mm sealing plugs      |
| Weight     | 1.47 kg without nose equipment |



**AV5**

|            |                               |
|------------|-------------------------------|
| Stroke     | 30 mm                         |
| Pull Force | 36 kN                         |
| Capacity   | 10.0 - 19.0mm sealing plugs   |
| Weight     | 2.8 kg without nose equipment |

### Automation

#### Automated systems

Fully automated Viking® system can be robot mounted and integrated into unmanned production cell.

#### Customer example

Application consists of sealing redundant oil galleries on cylinder heads and blocks in order to improve the total quality of the engines.

Oil leaks are undesirable for the engines and lead to a negative impact on quality image.

An automated Viking placing system is integrated into unmanned production cells and three Avseal plugs are placed in 22 seconds.





**AVDEL**

Structural Blind Fasteners

**INTEGRA**

Plastic Components

**NELSON**

Stud Welding

**OPTIA**

Threaded Fasteners

**POP**

Non-structural Blind Fasteners

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