

# ***Air Intake & Induction***

Leak-free solutions for higher efficiency





Our mission is to downsize. When it comes to designing an engine, we are constantly striving to maximize engine weight loss to ultimately reduce the permeation rates. Leakages can be detrimental to manufacturers, drivers and of course the environment. When we produce our high quality products with a safe seal connection, we help reduce breakdowns and leakages.

We believe that thinking smaller can make a big difference.







Customer Value through Innovation

NORMA Group’s innovative Engineered Joining Technologies and applications know-how make cleaner, more efficient use of precious energy sources in areas such as Cooling System, Air Intake & Induction, Emission Control, Ancillary System and Infrastructure. NORMA Group trademark products are distributed via a network of carefully selected companies specializing in volume distribution in their national market segments to reach the industrial aftermarket segment.

Global needs for greater energy efficiency in key sectors like transport and industrial infrastructure offer excellent growth prospects across the Group’s broad portfolio of Engineered Joining Technology. Maintained investments in innovative solutions fund the continued development of new products and technologies.

We will continue to strengthen the close strategic cooperation that has helped clients use our Engineered Joining Technology solutions make a major impact on their businesses. At the same time as we develop forward-thinking partnerships for our mutual benefit.

- W1** = Zinc Plated Mild Steel
- W2** = Stainless Steel with Zinc Plated Mild Steel Fasteners
- W3** = Ferritic Stainless Steel
- W4** = Austenitic Stainless Steel
- W5** = High Temperature & High Corrosion Resistant Austenitic Stainless Steel
- W6** = Aluminum Alloy

*Note material descriptions apply to metal products only*

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# Hose Clamps

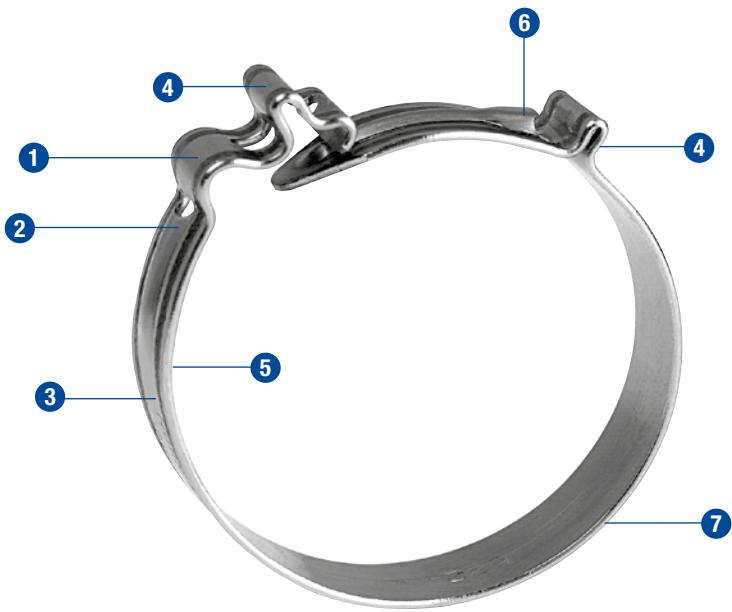
## Compact design and less weight

Designed for air intake applications, Hose Clamps from NORMA Group help reduce weight compared to other clamp solutions. Space savings are also possible thanks to compact clamp design and installation.



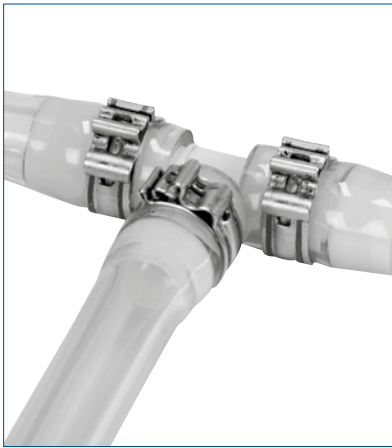
Hose Clamps

COBRA – ONE-PIECE HOSE CLAMPS



The advantages at a glance

- One-piece hose clamp
- Fast and easy fitting
- Maintenance-free fit
- Min. 240 h corrosion resistance in salt spray testing



Materials

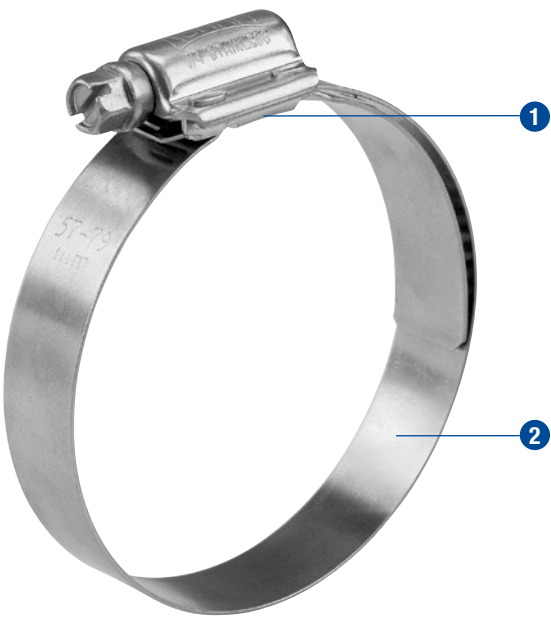
W1*	W2	W3	W4	W5
			x	

\* No chromium VI used for surface treatment

HD

HD clamps are suitable for special areas of application where high tightening torques and high contact pressures are required, for example, for fastening steel reinforced silicon, plastic and rubber hoses.

The HD clamp is an add-on type to our range of worm drive hose clamps and therefore only available in 16 mm band width and W4 material quality.



The advantages at a glance

- 16 mm band width
  - W4 material
- Extended bridge**  
– prevents the hose from protruding and being damaged
  - 16 mm band width**

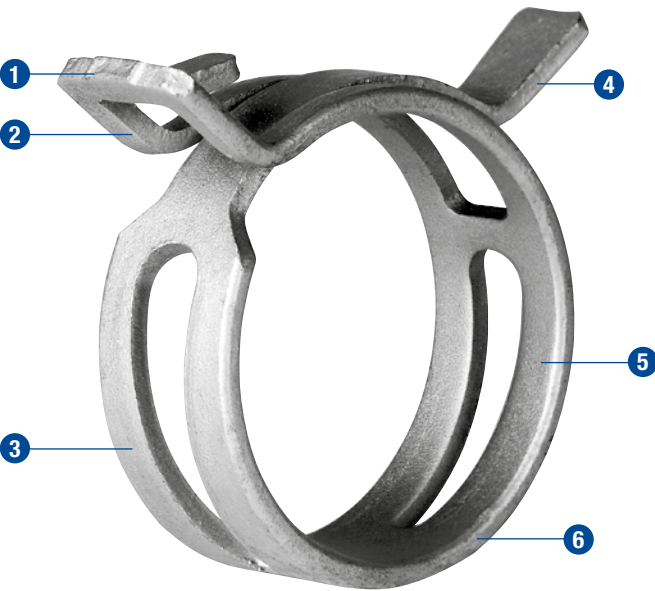
Materials

W1	W2	W3	W4	W5
			x	

FBS – SPRINGBAND HOSE CLAMPS TO DIN 3021

Thanks to their design, FBS springband hose clamps are particularly suitable for use with hose-spigot connections which are submitted to extreme temperature changes. Once assembled FBS provide a continuously readjusting dynamic tightening effect.

Also at low temperatures the radially acting tightening force is sufficient to assure a reliable tightness of the system. Even hoses when FBS are used.



The advantages at a glance

- Single-part hose clamps without screw
- Uniform distribution of clamping forces
- Optimal roundness
- Temperature resistance from –40°C up to 200°C
- Unmistakable tracing due to batch numbering
- Visual control of nominal diameters by color codes
- Corrosion resistance in salt spray – testing – 720 h on mandrel

- 1 **Batch number stamped on clamp band**  
– safe retraceability
- 2 **NORMA® logo** – the visible sign for high quality
- 3 **Inorganic/organic coating**  
– optimal protection against corrosion  
– coating in different color
- 4 **Nominal diameter stamped on the clamp**  
– prevents mistakes
- 5 **Special design** – uniform distribution of clamping forces and optimal roundness
- 6 **Round band edges**  
– optimal hose protection

Materials

C 75 S	Zinc-Aluminium Coating	Organic Coating
X	Basecoat	Topcoat

FBS

FBS to DIN 3021

– is a space-saving clamp. It was designed with the aim of realizing the technical minimum overall height to allow its use in difficult assembly situations.



FBS HC

– is a pre-opened version secured by a plastic retaining clip. After slipping the clamp onto the hose, this clamp can be easily removed by hand.



FBS MC

– is a pre-opened (and, if desired, pre-positioned) clamp secured by a small metal clip. The retaining clip for this version is removed by using pliers.



FBS C

– is a pre-opened clamp which is pre-positioned on the hose. The retaining mechanism for this version is an integral part of the clamp band.



S/SP – SEALING CLAMPS

Sealing clamps (S) to DIN 3017, Retaining clamps (SP) to DIN 3016

Thanks to their robust clamping brackets with metric bolts the clamping force offered by S/SP is very high. We recommend the two-part version for applications submitted to extreme pressure and tensile loads.



The advantages at a glance

- Material: W1, W5
  - Chromium VI free: compliant with ROHS, WEEE and ELV Environmental Directives
  - Clamping ranges to DIN 3017 and 3016
  - Larger diameters upon request
- 
- 1 **Strong clamping brackets**
    - high clamping force
    - optimum sealing
  - 2 **Bridge**
    - optimum hose protection
  - 3 **Robust band with rounded edges**  
(from band width 20 mm)
    - prevents injuries and damage to the hose

Materials

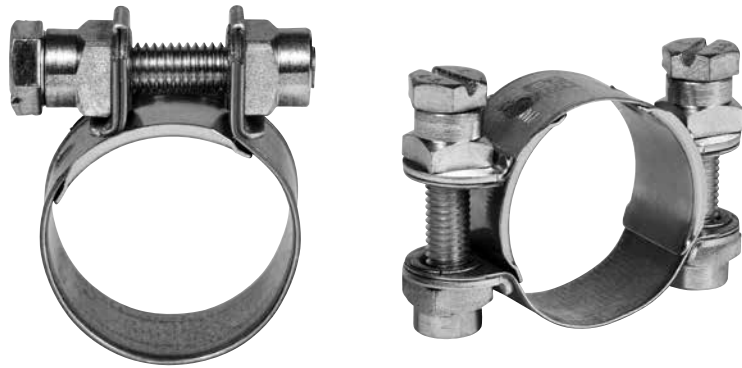
W1	W2	W3	W4	W5
x				x

Clamp Types

S

Hose sealing clamps are used to seal rubber and plastic hoses as well as rubber sleeves on pipe ends or connecting spigots. Larger diameters can be connected without problems using two-part clamps.

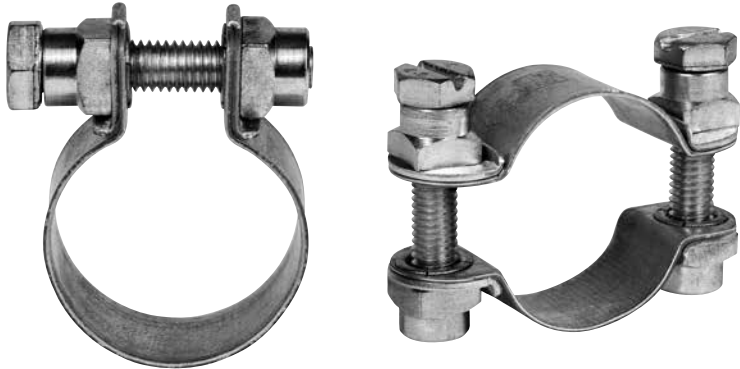
- Sizes are stepped up in 1 mm intervals
- Available in W1 and W5



SP

Retaining clamps are suitable for clamping containers, pipes and cables.

- Available sizes and bandwidths on request

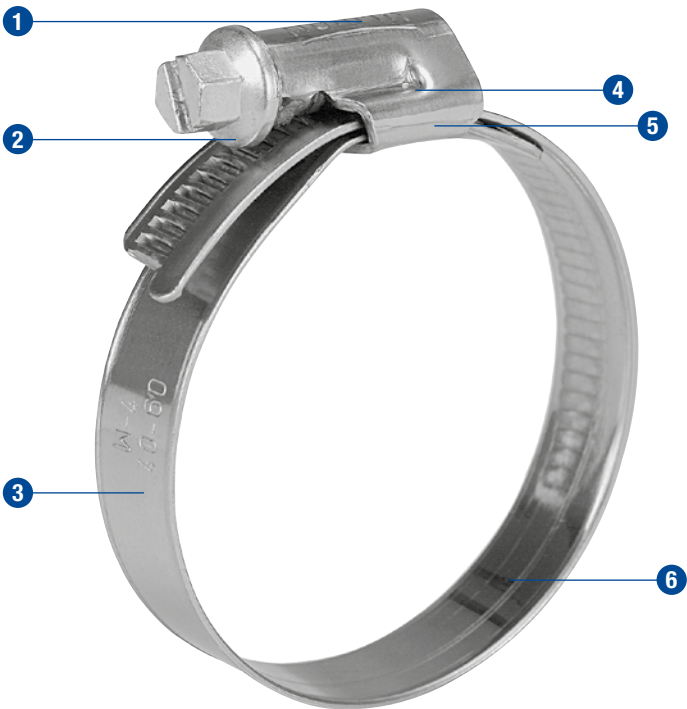


WORM DRIVE HOSE CLAMPS

TORRO® – WORM DRIVE HOSE CLAMPS TO DIN 3017

TORRO® worm drive hose clamps are specially suitable for applications under high mechanical loads. Since we are continuously working to improve its features this clamp is still setting standards for modern hose clamp design.

The distinguishing feature of the TORRO® is the asymmetrical construction which tells you at first sight whether it is a genuine TORRO® or not.



The advantages at a glance

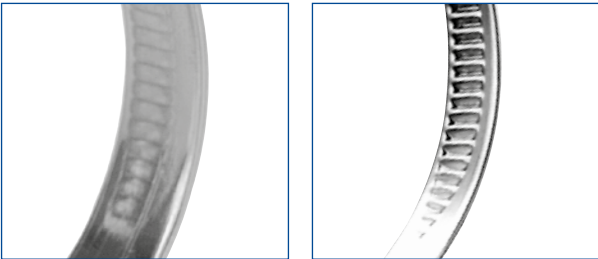
- Multi-range hose clamp
- Material: W1, W2, W3, W4, W5
- Chromium VI free: compliant with ROHS, WEEE and ELV Environmental Directives
- Clamping ranges to DIN 3017: 8–16 mm up to 140–160 mm
- Larger diameters on demand

- 1 Improved asymmetric housing**  
– even distribution of forces and safe assembly
- 2 Screw support**  
– ease of assembly due to the safe guidance of the emerging band end
- 3 Material and clamping range stamped on the band**  
– prevents errors
- 4 Asymmetric extension**  
– prevents the housing from tilting over when the clamp is tightened
- 5 Short housing saddle**  
– even contact pressure  
– improved efficiency
- 6 Smooth or stamped inside of band**  
– optimal hose protection

Materials

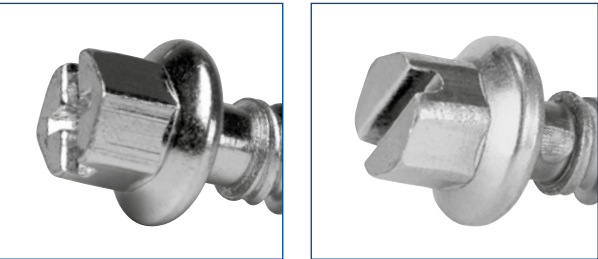
W1*	W2*	W3	W4	W5
x	x	x	x	x

Types of clamp band



- Band width 7.5 mm**
- W2, W3 with smooth inside
- Band width 9 mm**
- W1 with smooth inside
  - W2, W3, W4, W5 with stamped inside
- Band width 12 mm**
- W1, W2, W3 with smooth inside
  - W4, W5 with stamped inside

Screws



		W1	W2	W3	W4	W5
Phillips head	SW 7*	•	•			
Slotted head	SW 7**			•	•	•

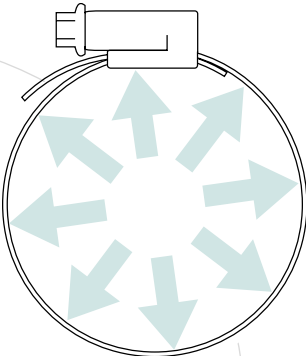
\* Band width 7.5 mm = SW 6      \*\* Band width 16 mm = SW 8

High band tensile force and high fracture torque

As always, the new TORRO® features high tensile forces. However, when compared with competitors' products and the previous model, we now achieve significantly higher fracture torques. This provides for an increased assembly reliability.

Even clamping force distribution

Thanks to its enhanced technical design, the new TORRO® range delivers an even distribution of clamping force. The clamp sits perfectly on the hose and ensures the optimal sealing of the connection.



Corrosion resistance

Material	Corrosion resistance in salt spray testing
W1	Min. 144 h
W2	Min. 72 h
W3	Min. 200 h*
W4	Min. 400 h
W5	Min. 1000 h

\* Max 10% corrosion of the base material allowed

Applications in combustion engines

- Cooling water lines
- Depressurized as well as pressurized fuel lines and vent lines
- Oil lines
- Air ducts, both vacuum and express pressure applications (e. g. charged air) up to 140–160 mm
- Larger diameters upon request



# WORM DRIVE HOSE CLAMPS

## Modular System

### TORRO®

The TORRO® modular system offers several features that can be added to the clamp, in order to modify its technical characteristics. You are free to combine two or more of these accessories according to your requirements.



#### The Notch

The notch is a clever option for pre-positioning the TORRO® hose clamp on the hose. In this case the oval hole in the clamp band finds its exact counterpart on the hose surface. Thus the TORRO® is safely and accurately kept in place prior to the final assembly.

- Safe pre-assembly on the hose
- Smart weight saving option without weakening the performance of the clamp



#### The Prefix Clamp

With this accessory the TORRO® can also be pre-positioned on the hose. The two 'teeth' of this device keep the TORRO® hose clamp safely in place if it needs to be stocked or transported prior to its final assembly.

- Safe pre-assembly on the hose



#### The Spring Insert

For this version of the TORRO® the standard hose clamp is equipped with a spring insert on the inside of the clamp band. When tightening the screw the spring is loaded and stores sufficient clamping force to ensure a long-lasting automatic retensioning effect. Thus the radial clamping force achieved will be sufficient even under extremely low temperatures. Therefore, the TORRO® is an optimal solution for applications under extreme temperature changes.

- Automatic re-tensioning effect in the event of hose relaxation
- Increased sealing reliability across a wide temperature range



#### The PreFix System

The PreFix System is a concept for integrated clamps and clips on hoses and pipes. The demand for complete systems that include the appropriate sealing function is increasing.

- Safe pre-assembly on the hose



#### The Radial Insert

The Radial® Insert clamp consists of a standard riveted clamp with a stainless steel liner. This insert in the radial acts as a spring.

- Radial integrated element located on the inside of the clamp band
- High contact pressure due to the radially corrugated design
- There are also dynamic properties
- Only available in 9 mm bandwidth

### ABA ORIGINAL

ABA Original clamps feature unique, one-piece housing, rolled-up band edges and a non-perforated (embossed) band that protect the hose. For added corrosion resistance the band in the 12 mm Standard is made of Aluzinc which gives three times the protection offered by conventional galvanized steel.

#### ABA Original

- Features high clamping force and high durability torque
- Aluzinc
- Also available in W5 material



#### ABA Original Stainless

- All parts in AISI 304 Stainless Steel



## The advantages at a glance

- Solid band
- Rolled up band edges
- Smooth inside
- House protected from pipe

## WORM DRIVE HOSE CLAMPS

### ABA NOVA 9 MM ALUZINK S20, STAINLESS S40(W4) AND ACID RESISTANT S50(W5)

The highly versatile ABA Nova clamp is an ideal choice for smaller dimensions of hoses. The base of the housing is cut back and the internal tolerances are very close: a few hundredths of a millimetre. Available for a wide range of hose dimensions, it retains its roundness and sealing qualities even on the smallest of hoses.

**ABA Nova Standard-S20(W1)** – Screw: Electro zinc plated. Band: Galfan. Housing: Painted

**ABA Nova Stainless-S40(W4)** – All parts are made of SS 2333/AISI 304 Stainless Steel

**ABA Nova Acid Resistant-S50(W5)** – All parts are made of SS 2343/AISI 316 Stainless Steel



### ABA SAFE™ 12 MM ALUZINK S20 AND STAINLESS S40 (W4)

ABA Safe™ utilizes the flexibility of the hose (rubber) and protects soft hoses against damage. The profile beads increase the clamp pressure locally, which means the clamp can also be used for plastic piping that is relatively resistant to deformation. ABA Original clamp provides the clamping force needed for an effective joint.

**ABA Safe™ Standard-S20** – See ABA Original 12 mm Standard

**ABA Safe™ Stainless-S40(W4)** – See ABA Original 12 mm SS 2333/AISI 304 Stainless

In both versions the inner ring is made of cold rolled steel SS 2331/AISI 301



### BREEZE HI-TORQUE™

The strongest worm-gear clamp made in the world today. Increased installation torque over the SAE torque requirements for Type F worm-gear clamps. Eight screw-threads are engaged in the band simultaneously for incredible torquing drive (over 150 in.lbs.), sealing pressure, and vibration resistance.

5/8" (15.8 mm) band  
5/16" (7.9mm) hex head screw

Per SAE standard J1508 Type "HD"  
Also available in 316 Stainless Steel – use HTS prefix for standard ranges and HPS prefix for extended ranges



### BREEZE POWER-SEAL®

General purpose combustion engine and industrial clamps. High strength four-piece Quadra-Lock construction. Exceeds all SAE requirements. Use for all standard clamp applications.

- 1/2" (12.7 mm) band
- 5/16" (7.9 mm) slotted hex head screw
- Per SAE standard J1508 Type "F"





WORM DRIVE HOSE CLAMPS

HEAVY DUTY CLAMPS

BREEZE LINER

An integral extension of the band as an inner liner protects soft-surface hose (silicone and others) from damage caused by extrusion or shearing through the band slots. Liner clamps afford maximum protection to soft hoses while providing a true concentric seal.

- Standard 1/2" (12.7 mm) band  
5/16" (7.9 mm) slotted hex head screw
- Per SAE standard J1508 Type "F"



BREEZE CONSTANT-TORQUE®

The Breeze CONSTANT-TORQUE® is a breakthrough in clamping technology. A belleville spring mechanism permits the CONSTANT-TORQUE® clamp to automatically increase or decrease its own diameter due to changes in operational or environmental temperatures.

This unique design eliminates "cold flow" leaks. Both the Aero-Seal and Heavy Duty construction CT clamps have an extended inner liner which protects all types of hoses from damage and helps maintain consistent sealing pressure.



Constant-Torque - Aero Seal Construction  
Per SAE standard J1508 Type "SLF"



Constant-Torque - Heavy Duty Construction  
Per SAE standard J1508 Type "SLHD"

GBS – HEAVY DUTY CLAMPS TO DIN 3017

GBS are particularly suited for sealing suction and pressure lines with plastic or steel reinforcements and high shore hardnesses. Their distinguishing feature is the extremely high band tensile force.

The assembly of GBS is easily completed by means of manual, pneumatic or electric standard tools.



- 1 W1/W2**  
– new specially designed bolt with integrated spacer – improved efficiency, cannot get lost. W5. Hexagonal socket screw
- 2 Reinforced loops**  
– withstand significantly higher torques
- 3 Mechanically locked closure**  
– no welding points, no contact corrosion
- 4 Bridge**  
– optimal hose protection
- 5 Robust band with rounded edges**  
– protection against injuries and damage to the hose surface

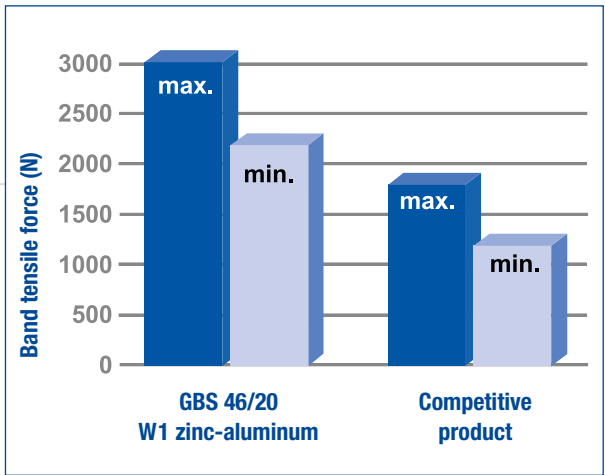
Technical features

**Band tensile forces**  
The results of numerous test sequences proved that GBS are superior to comparable competitive products.

Materials

W1*	W2*	W4	W5
x	x	x	x

\* No Chromium VI used for surface treatment of closure unit



HEAVY DUTY CLAMPS

GBS WITH QR CLOSURE

On request the GBS is available with QRC (Quick-Release Closure). The hinged bolt can be quickly released and enables the fast and easy assembly or disassembly of the clamp.

- Available in all materials W1 , W2, W4, W5.



GBS MULTI-PART VERSION

The two-part version of the GBS is an additional clamp type in this range.



HEAVY DUTY T-BOLT HOSE CLAMPS

T-Bolt hose clamps are intended for use where other hose clamps do not work. Typical applications include air intake systems, cold side charge air hose connections and a variety of hose, pipe and ducting joints.

- Available in diameters 1.75" (44.5 mm) and larger, T-Bolt hose clamps can be configured to suit almost any application and operating environment
- Also available: different materials and Quick Connect or Quick Release latch styles

T-BOLT SERIES

**Mini** – 9/16" (14.3 mm) wide stainless steel band with plated steel bridge, M5 or #10 T-Bolt and hardware.

**SAE Type TB** – 3/4" (19 mm) wide stainless steel band and shoe with 1/4" (6.4 mm) plated steel T-Bolt and hardware.

**SAE Type TB** – 3/4" (19 mm) wide stainless steel band with floating bridge, 1/4" (6.4 mm) plated steel T-Bolt and hardware.

**SAE Type TB** – all stainless steel construction including, 3/4" (19 mm) wide band, floating bridge, 1/4" (6.4 mm) T-Bolt and hardware.

**Super Duty** – 7/8" (22.2 mm) wide stainless steel band, shoe and trunnion with 5/16" (7.9 mm) plated steel T-Bolt and nut.



T-Bolt clamp with floating bridge



T-Bolt clamp with shoe



T-Bolt clamp plain band



HEAVY DUTY CLAMPS

FLEX SEAL™ HOSE CLAMPS

FLEX SEAL™ hose clamps incorporate a compression spring to accommodate joint diameter changes resulting from hose set and thermal effects. They are accepted industry wide for use on charge air and coolant system hose connections.

- Heavy Duty T-Bolt and FLEX SEAL™ hose clamps usually have a diameter take up range of 5/16" (7.9 mm)
- Also available: different materials and Quick Connect or Quick Release latch styles

FLEX SEAL™ Series

**Mini** – 9/16" (14.3 mm) wide stainless steel band with plated steel bridge, M5 T-Bolt and hardware.

**SAE Type SLTB** – 3/4" (19 mm) wide stainless steel band with floating bridge, 1/4" (6.4 mm) plated steel T-Bolt and hardware.

**SAE Type SLTB** – 3/4" (19 mm) wide stainless steel band with floating bridge, 1/4" (6.4 mm) plated steel T-Bolt and hardware, includes special long travel spring to accommodate larger changes in joint diameter.



Heavy Duty Flex



Flex Seal Channel



Flex Seal Standard



Flex Seal Mini

BREEZE T-BOLT SPRING-LOADED

Breeze Spring-Loaded T-Bolt clamps provide comprehensive application coverage and are performance engineered. They meet the same durability, torque and quality standards as the standard Breeze T-Bolt clamps. The spring design adds constant tension performance. Available in standard and heavy duty springs.

- 3/4" (19 mm) band
- Per SAE standard J1508 Type "SLTB"



WIDEBAND HOSE CLAMPS

BRS – WIDE BAND HOSE CLAMPS (BRS) TO DIN 3017-5



BRS wide band hose clamps, in combination with a rubber sleeve, are particularly suitable for connecting pipes with smooth ends. Cast iron pipes and steel pipes as well as plastic or glass pipes are joined securely and without welding.



The advantages at a glance

- Extra wide clamp band
- Large-area distribution of clamping forces
- Increased transverse rigidity
- Single and multi-part versions

Screws

	Hex head with slot W2	Hex head W4
		
Band width 48 mm	M 6 x 38 Sz	M 6 x 45 Sk
Band width 54 mm	M 8 x 47 Sz	M 8 x 50 Sk
Band width 65 mm	M 8 x 47 Sz	M 8 x 50 Sk

BRS sealing clamps are manufactured in standard band widths and materials. Sizes increase in steps of 1 mm for single-part clamps.

Up to a clamping diameter of 300 mm they are supplied in rolled-up form, from 301 mm clamping diameter they are supplied in open form.

- 1 Bridge
  - hose or sleeve ends are completely covered
- 2 The extra wide band is gentle on the hose or the sleeve
  - distribution of clamping force over the complete band width
  - no damage to the object to be clamped
  - increased transverse rigidity

Materials

W1	W2	W3	W4	W5
	x		x	



Pipe Connections and V-Band Clamps

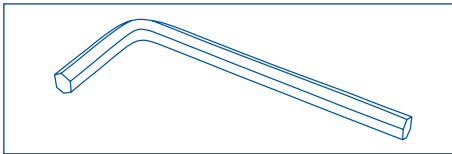
Increasing fuel efficiency

NORMA Group's V-Band Clamps enable weight savings and also require considerably less space compared to solid flanges. This leads to reduced fuel consumption and a more flexible usage of space around the application.

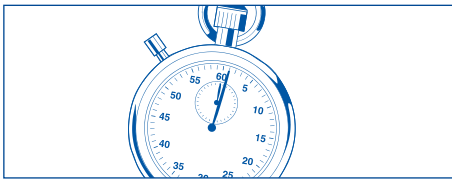


PIPE CONNECTIONS AND V-BAND CLAMPS

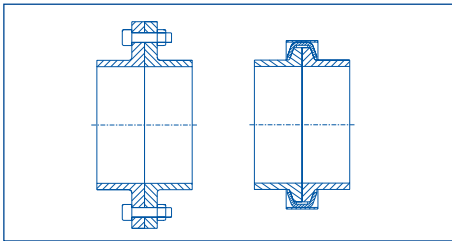
PRODUCT ADVANTAGES



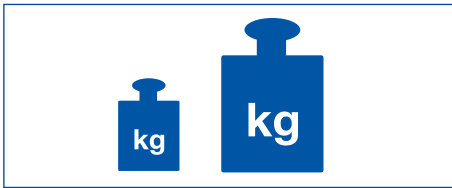
**Easy handling**  
Profile clamps are easy to handle and can be assembled with conventional tooling.



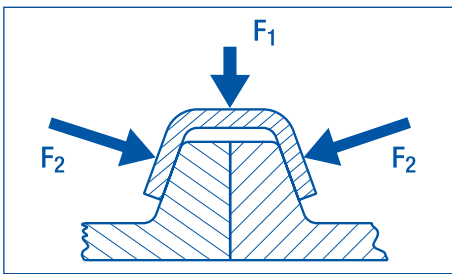
**Quick assembly**  
Profile clamps are quick to assemble saving time and money. With a single closure design, only one bolt has to be tightened to produce a secure joint.



**Compact design**  
In contrast to conventional flanges, profile clamps require only minimal space and can therefore be used in critical fitting situations



**Lightweight**  
Compared to flanges, profile clamps are extremely lightweight. This helps reduce the total weight of the system.



**Product function**  
The profile clamp works on the principle of the inclined plane: when the closure is tightened, a circumferential force  $F_1$  is exerted on the profile segments. By means of the profile, the two flange parts are pressed together (see drawing). The exerted circumferential force is converted into a considerably higher axial force  $F_2$ .

V-BAND CLAMPS

V-Band clamps are reliable and time-effective connection elements for industrial use. They are made to customer requirements and can be supplied with various profiles, band widths and closure types.



The advantages at a glance

- Extra wide clamp band
- Large-area distribution of clamping forces
- Increased transverse rigidity
- Single and multi-part versions

- 1 Coverband**  
– optimal distribution of clamping forces
- 2 Closure**
- 3 Three profile segments**  
– ease of assembly

Materials

W1	W2	W3	W4	W5
	x		x	

# PIPE CONNECTIONS AND V-BAND CLAMPS

## CLOSURE TYPES

### QRC – Quick-Release Closure



- Advantages:**
- All the advantages of STC-type closures
- Plus**
- Rapid closing and opening
  - Captive closure components
  - Significantly shorter installation times
  - Closure bolt secured during tightening

### STC – Straight Trunnion Closure



- Advantages:**
- High-strength precision-machined components
  - Manufactured from consistently high-quality materials
  - State-of-the-art automated manufacturing
  - Competitively priced

### SVS



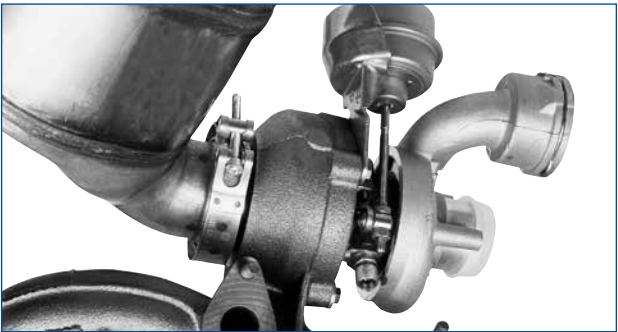
The SVS closure incorporates an over-center lever which enables assembly by hand.

- Advantages:**
- Assembly without tool
  - Ideal for frequent joint release

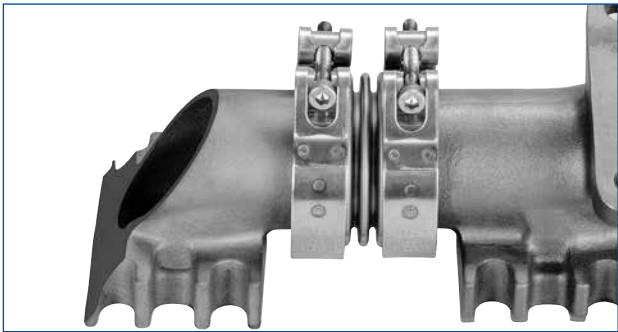
## EXAMPLES OF TYPICAL APPLICATIONS

V-Profile clamps are quick assembly connecting devices for flanges which offer an economical alternative to conventional bolted flange joints.

### Turbocharger / Catalyst connection



### Exhaust manifold



### Industrial: Bulk handling vessel



### Industrial: Bypass filter unit





# PIPE CONNECTIONS AND V-BAND CLAMPS

## V-INSERT CLAMPS – GENERAL PURPOSE



General Purpose V-Insert

- **Materials:** Corrosion resistant and specialty steels
- **Fasteners:** #10, 1/4" (6.4 mm), 5/16" (7.9 mm)
- **Sizes:** 2" (51 mm) and larger diameters
- **Options:** Two tightening points (180° apart)

### Features

- V-Inserts welded to a flexible outer band

### Applications

- Pumps
- Diesel engines
- EGR systems
- Truck exhaust connections
- Turbochargers, and other flanged joints



## LIGHT DUTY



Light Duty V-Insert WG-band with Hex Screw

- **Materials:** Corrosion resistant steels
- **Fasteners:** 5/16" (8 mm) slotted hex screw
- **Sizes:** 1.75" (44.5 mm) to 7" (178 mm) diameter

### Features

- V-Inserts welded to a low cost stainless steel worm gear clamp

### Applications

- Dairy equipment
- Diesel engines

## SWING KNOB



Swing Knob V-Insert

- **Materials:** Corrosion resistant and specialty steels
- **Fasteners:** #10, 1/4" (6.4 mm), 5/16" (7.9 mm)
- **Sizes:** 2" and larger diameters
- **Options:** Two tightening points (180° apart)

### Features

- V-Inserts welded to a flexible outer band; pivoting latch allows the clamp to be opened with minimal rotation of the nut

### Applications

- Filters
- Mixers
- Separators



## PIPE CONNECTIONS AND V-BAND CLAMPS

### QUICK CONNECT



Slot V-Insert with Handle



Quick Connect V-Insert

- **Materials:** Corrosion resistant and specialty steels
- **Fasteners:** 1/4" (6.4 mm) and 5/16" (7.9 mm)
- **Sizes:** 2" (51 mm) and larger diameters
- **Options:** Two tightening points (180° apart)

#### Features

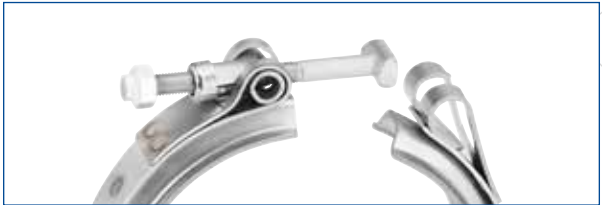
- V-Inserts welded to a flexible outer band, latch allows the clamp to be installed quickly without removing the nut

#### Applications

- Automotive exhaust systems
- Filters
- Food processing systems
- Ducting connections



Slot V-Insert with Handle



Quick Connect V-Insert

### V-BAND CLAMPS – ROLL FORMED



Roll Formed V-clamp Unequal Straps

- **Materials:** Corrosion and heat resistant steels
- **Fasteners:** 1/4" (6.4 mm)
- **Sizes:** 3.5" (89 mm) to 12" (305 mm) diameter
- **Options:** Short loop configuration for added clearance, drain holes in V-Retainer

#### Features

- Continuous V-Retainer and partial outer band, compact profile to fit flanges having limited clearance

#### Applications

- Turbochargers



Roll Formed V-clamp Assembly



Roll Formed V-clamp with Equal Straps



# PIPE CONNECTIONS AND V-BAND CLAMPS

## UNI-FLEX



Uni-Flex V-clamp type

- **Materials:** Corrosion resistant steels
- **Fasteners:** 1/4" (6.4 mm)
- **Sizes:** 4" (102 mm) to 9" (229 mm) diameter
- **Tooling:** Applications specific

### Features

- Cost-effective continuously formed metal band having two 180° V-Retainers and a hinge point for flexibility

### Applications

- Turbochargers
- Diesel exhaust connections

## HALVES



Stamped Half clamp type

- **Materials:** Steel, plated steel, corrosion and heat resistant steels
- **Fasteners:** #10, 1/4" (6.4 mm), 5/16" (7.9 mm)
- **Sizes:** 2" (51 mm) to 14" (356 mm) diameter
- **Tooling:** Applications specific
- **Options:** Carriage, hex head or special bolts, captivated nuts

### Features

- Two separate V-Retainers with two bolts, develops a more uniform clamping load than a single bolt clamp, spot weld free construction enhances corrosion resistance

### Applications

- Air brakes exhaust connections
- Diaphragm pumps
- Turbochargers

## E-SERIES



Double hinge points type clamp

- **Materials:** Steel, plated steel and corrosion resistant steels
- **Fasteners:** 1/4" (6.4 mm) and 5/16" (7.9 mm)
- **Sizes:** 1.75" (44.5 mm) to 7" (178 mm) diameter
- **Tooling:** Applications specific
- **Options:** Carriage or hex head bolts, captivated nut

### Features

- Economical coupling, continuously formed metal band with two 180° V-Retainers and a hinge point, spot weld free construction enhances corrosion resistance

### Applications

- Ducting
- Air and exhaust connections

## VPP – CHAIN LINK



- 1 Bolt
- 2 Nut
- 3 Profile half
- 4 Chain link

### Features

- Two V-Retainers connected with a hinge for easy installation, spot weld free construction enhances corrosion resistance.

### Applications

- Turbocharger turbine housing

## PIPE CONNECTIONS AND V-BAND CLAMPS

### BREEZE V-BAND

Breeze V-Band clamps provide fast, secure coupling for connecting flanged joints. The V-Band clamp features high strength and positive sealing integrity.



- Custom designs and sizes available
- Typical applications include heavy duty diesel engine exhaust and turbochargers



## Retaining Products



### Maximizing assembly efficiency

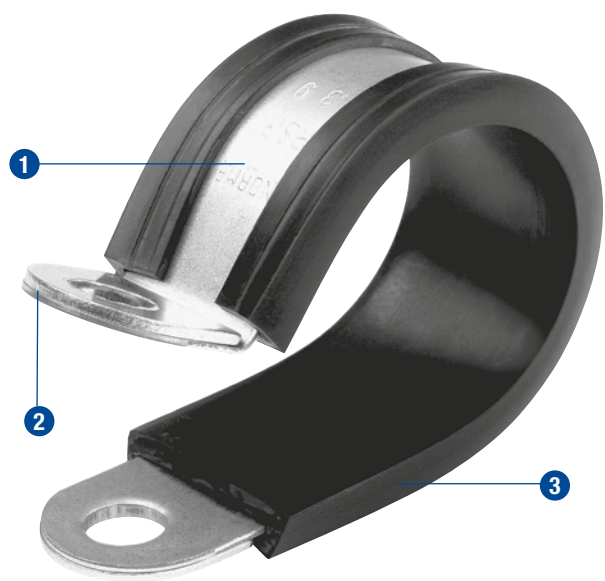
NORMA Group’s Retaining Products fit most retaining applications. In combination with NORMA Group’s Fluid Systems, they create “ready to install” solutions, significantly reducing assembly times.



RETAINING PRODUCTS

RS/RSGU – PIPE RETAINING CLIPS TO DIN 3016

RS/RSGU pipe retaining clips are the ideal retaining elements for pipes, cables, cable harnesses, cable protection pipes, hoses and other applications.



Type 1

- 1 Form fitting and adjustable band**
  - ease of assembly
  - safe attachment
- 2 Reinforced band ends**
  - prevent the clip from tearing or loosening in cases where there is a high mechanical load
- 3 Optionally supplied with EPDM or Silicone Profile Remove Chloroprene**
  - vibration damping & protection against seepage water
  - sound insulation
  - clip fits tight on object

Materials

W1	W3	W4	W5
x	x*	x*	x*

\* On request

RSV/RSGU-V CLIP

In addition to the standard RS/RSGU designs we offer a V-feature. This special design, a variation of the standard RS/RSGU Type 1, is provided with an integrated mounting fastener. When the clip ends are compressed the fastener locks into place and locks the clip. Thus, the RS/RSGU clamp with V-feature can be easily pre-assembled on the pipe.

- Diameters and band widths will be furnished on request

Materials

W1	W2	W3	W4*	W5*	W6*
		x	x	x	x

\* On request



RLGU CLIP

Recently a new type, the RLGU, was added to our Retaining Products range. It is also a variation of the standard Type 1, but without reinforced band ends and therefore suitable for use in applications submitted to only slight mechanical loads as, for example, the fastening of cables.

- RLGU are only available in band width 12 mm
- For the complete program please refer to the table of sizes



CLIP TYPES TO DIN 3016

All pipe retaining clips are available with a special sound damping rubber profile as optional equipment. The standard version RS/RSGU clips (**Type 1**) are also available in a round shape (RS/RSGU **Type 0**) or open shaped (RS/RSGU **Type 2**).



Type 0



Type 2





## Quick Connectors



### **Total reliability for high-end applications**

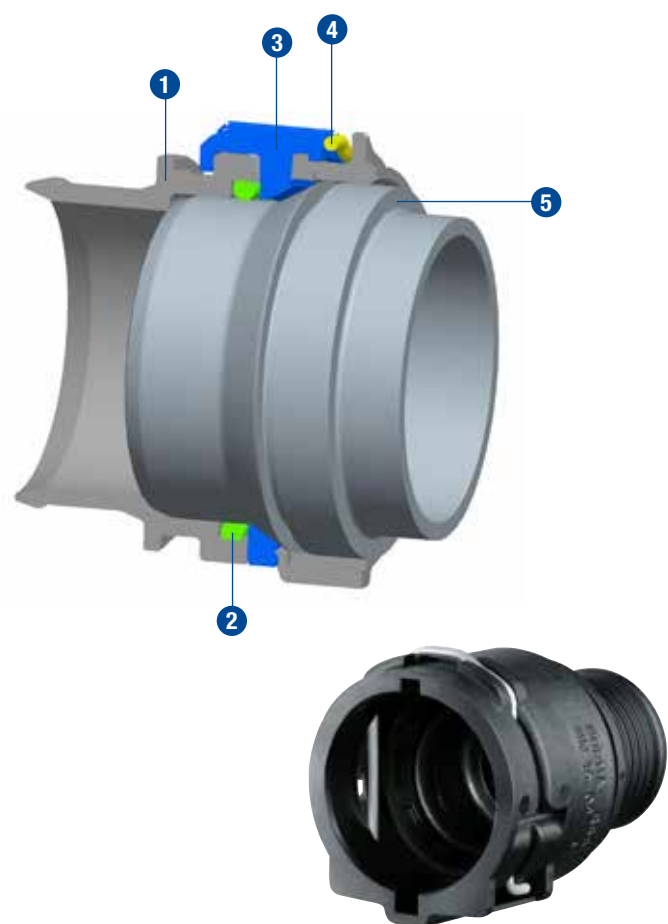
Specially designed for charged-air applications, NORMA Group's Quick Connectors are optimized for high-pressure and high-temperature applications. Fast and easy assembly, combined with ultra-compact dimensions, mean they work perfectly within the space available.



## QUICK CONNECTORS

### PS3 CHARGE AIR QC'S

PS3 "Push & Seal" plastic quick connectors are an ideal means for the secure connection of charged air systems to be used in pre-assembled systems.



### *The advantages at a glance*

- Can be mounted on a radiator or spigot
- Easy + secure seal to spigot
- Turbocharger to increase performance (e.g. high temperature)
- Click function for secure lock
- Easily disassembled
- Temp can reach 175°C
- To be used in pre-assembled systems

- 1 Housing
- 2 O-ring
- 3 Retaining ring
- 4 Retainer
- 5 Connecting spigot

#### Standard materials

PS3 quick connectors are made from recyclable materials. For charge air applications we use PA66-GF30 or PBT-GF30. Also PPA-GF30 has been realized for a high temperature application.

In case of special applications (e.g. charged air ducts) PS3 connectors can be made from other technical thermoplastic materials with different filler types and contents. Please note, however, that special types can only be made when the required minimum quantity is ordered.

#### Technical features

- **Medium/Fluid:** Charge air
- **Operating pressure:** Approx. 2.0 bar excess pressure
- **Operating temperature:** Engine compartment: -40°C to +135°C, Short time up to +175°C (approx. 30 min.). Even higher for special applications.

### V2

V2 plastic quick connectors are an ideal means to connect media carrying lines as well as ventilation and exhaust lines in the automotive industry. The connectors can be used for both line-to-line and line-to-device connections. V2 quick connectors can be applied on both plastic and metal spigots.



### *The advantages at a glance*

- Quick assembly time equaling cost reduction
- Automated production, no human factor means less margin of error
- No tools needed
- Compact dimensions allowing ease of use in narrow spaces
- An integrated seal provides optimal tightness
- All seals can be visually checked, permitting safe assembly
- Featuring extremely low permeation values

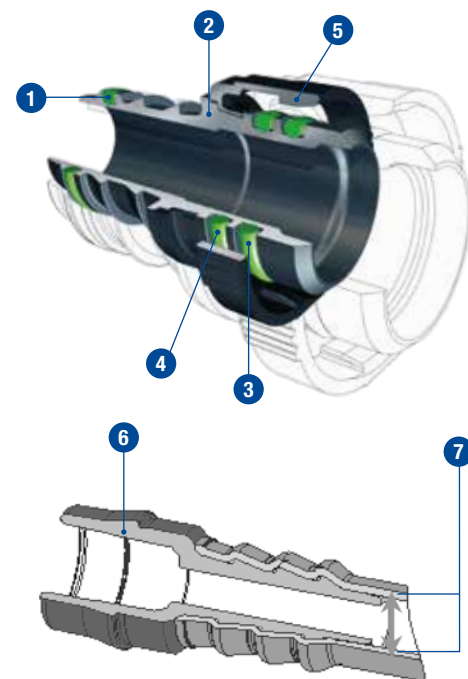
#### Technical features

- **Medium/Fluid:** Air, oil & fuel vapors
- **Long-term operating temperature:** from -40°C to 135°C
- **Short-term operating temperature:** up to +150°C (approx. 30 min.)

## QUICK CONNECTORS

### CONNECTING SPIGOT

NORMA Group standard (Production drawings will be made available upon request) V2 quick connectors can be used on both plastic and metal spigots. Please note that all V2 quick connectors are delivered without spigot. However, we will be pleased to offer suitable spigots on request.



#### Insider tip

The perfectly matched system is achieved when combining V2 quick connectors and NORMA Group Fluid Systems.



### *The advantages at a glance*

- Fast assembly without tool – reduced time and cost
- Robot assembly possible – automated processes
- Compact dimensions – to be used in narrow spaces
- Integrated seal – optimal tightness
- The seals can be visually checked – safe assembly work

- 1 **Firtree plus O-ring (optional)**
- 2 **Housing**
- 3 **Primary O-ring**
- 4 **Secondary O-ring**
- 5 **Locking device (ring)**
- 6 **Spigot**
- 7 **Pipe inside diameter = Nominal Width (NW)**

#### Technical features

- **Medium/Fluid:** Air, oil & fuel vapors.
- **Operating pressure:** Approx. 2,5 bar bar excess pressure
- **Operating temperature:** Engine compartment –40°C up to +135°C. Short time up to +150°C (approx. 30 min.)

### TWIST II

TWIST II is a “Push & Seal” plastic quick connector; an ideal solution for connecting air intake and cooling water systems.



### *The advantages at a glance*

- Can be integrated in end-tanks as well as be mounted on tubes or hoses
- A secure seal to the mating spigot with a low assembly force
- Robust and clear locking features with a click function to ensure a correct lock
- Easy operation for disassembly
- Temperature resistance of up to 180°C

#### Standard materials

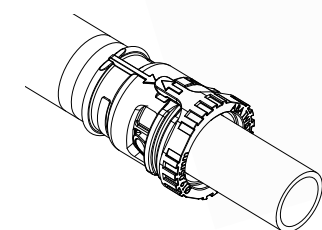
TWIST II quick connectors are made out of recyclable materials. As a standard solution polyamide 6.6 with 30% to 50% glass fiber reinforcement is used.

When an application requires, other engineering thermoplastic material can be used. Different reinforcement fillers and additional heat or hydrolysis resistance can also be added. Application based design is possible when a minimum required quantity is ordered.

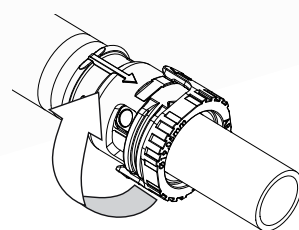


## QUICK CONNECTORS

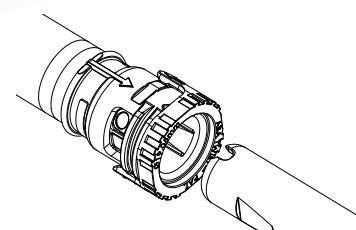
### TWIST II



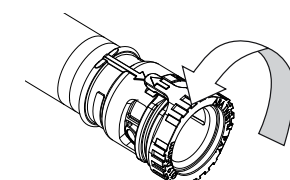
Assembly is in locked position.  
The arrow marks the closed position.



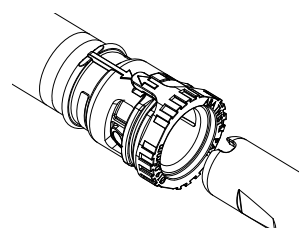
Turn connector ring to open position.



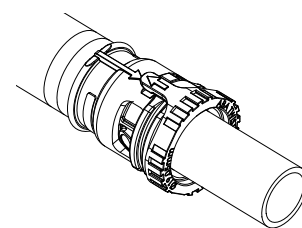
Pull connector backwards to disengage the joint.  
The connector is now released from its position.



Turn the connector ring back to its locked position. The arrow marks the closed position. Connector is now in a locked position and ready for engagement.



**IMPORTANT NOTICE**  
Notch in male part must be aligned with arrows marking "locked position" when engaging the female part to the male.



Listen for audible "click" or feel when connector is fully engaged. Connecting joint is now in a locked position.

### TWIST III

TWIST III is a quick connector series for charged air system applications. Developed to meet extremely tough requirements, especially in low-emission vehicles, it combines a low assembly effort with very good hydrolysis tolerance, temperature resistance and mechanical performance. TWIST III operates at approx. 2.75 bar excess pressure and engine compartment temperatures of -48°C up to +135°C. Standard design configurations are straight. Special designs are also available.



Standard design

Optional design

Optional design

#### Standard materials

Standard versions are made from recyclable polyamide 66 with 35% to 50% GF. O-rings are available in various materials, including AEM. Note that both plastic and metal spigots can be used.

TWIST III quick connectors have a 360° symmetrical design. As they can be opened from any angle, they are perfect for tight environments as well as spin-weld applications. Additional cut-outs or knobs are not necessary.

#### Quick and safe assembly/disassembly

Assembling TWIST III is quick and easy. Press the self-locking spider ring onto the mating spigot and check that all the ring-locking tabs have passed the spigot's locking edge. Then pull the connector to verify the connection.

To disassemble the connector, turn the spider ring counterclockwise, hold it in the open position and pull it off the mating spigot. When the connector disengages from the spigot, release the spider ring to automatically return it to its relaxed (locked) position.

TWIST III

Standard sizes and designs

TWIST III connector size designations are determined by the sealing diameter (ØD1) of the TWIST III spigot. Current standard diameters are listed below. Larger diameters will be added in the future.

Five standard sizes are available. TWIST III SP (spin-weld) is for applications where the quick connector will be spin-welded to other injection or blow-molded plastic components. Based on recommendations from a spin-welding equipment supplier, this design includes weld surfaces, flash traps and support surfaces. This connector is tested using the GMW 15803 specification as reference.

Standard sizes:

TWIST III Quick Connector	Ø D1 (mm)
TWIST III 48.40	48.40
TWIST III 56.40	56.40
TWIST III 67.40	67.40
TWIST III 71.40	71.40
TWIST III 80.00	80.00

Optional designs

A hot-plate weld design (TWIST III HP) is used for housings in PBT material, when the connector has to be welded to a flexible TPE / TPC-ET (HYTREL®) Duct, or with flexible plastic ducts. It is also the standard solution when hot-plate/mirror welding is applied. A further special design TWIST III AR) has an optional anti-rotation/assembly orientation feature. Other designs are also possible.

Please ask for details

TWIST III V0 (straight) and TWIST III V90 (90° bend) are optional designs with a hose barb for applications where a hose will be crimped/clamped onto the barb. Both allow reinforcement with an optional metal sleeve when required.







## Plastic Products

### Ready to work in any industry

Our broad range of plastic connectors is incredibly versatile and can be used in nearly any industry. Combining low weight with high performance and toughness means they are easy to handle and highly reliable.



## SV – PLASTIC PRODUCTS

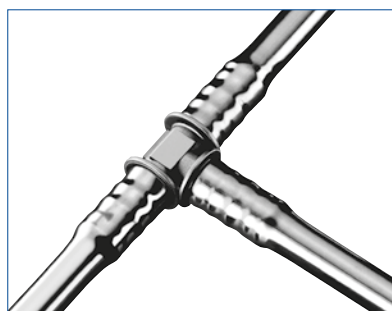
Over the years, these top quality very versatile connectors have been used in millions of different applications and the product has become an indispensable aid to the domestic, commercial and industrial market sectors. SV products are proven plastic hose and tube connectors, which connect fluid carrying lines reliably and at a competitive price.

SV hose and tube connectors are not only used in motor vehicles, but also in nearly every industrial application.



### *The advantages at a glance*

- High strength
- Tough
- Low weight
- Shock damping
- Scuff resistance
- High impact resistance



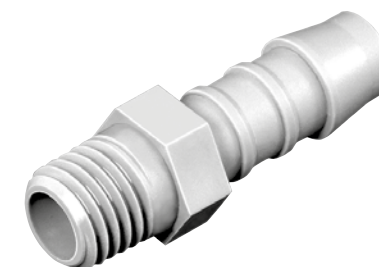
## TYPES AND VARIANTS

### 1. Taper thread connector

These SV connectors made of polyamide 6 feature on one end a tapered thread and on the other end one or two push-on spigots. The ribbed surface of the push-on spigots ensures that the hoses are tight-fit after assembly. Three different thread geometries are distinguished by means of colour coding allowing for a quick visual identification:

- Metric taper thread.....light gray
- Whitworth pipe thread .....charcoal
- NPT thread .....black

(Other materials are available on request)



### 2. Hose connectors

These SV connectors without thread hoses are connected quickly and easily with one another by just pushing the hose onto the connectors. The ribbed surface of the push-on spigots ensures that the hoses are tight-fit after assembly. The SV hose connectors are made of ecru-coloured POM (acetalcopolymerisat); other materials are available on request.



### 3. Compression

The SV threaded connectors feature on one end a metric thread and on the other end one or two pipe unions. These compression connectors are made of black polyamide 6 with 30% glass-fibre reinforcement.



### 4. Push-on connectors

These SV parts are used for connecting plastic pipes made of PA6 or PA12. With these connectors safe connections can be achieved even without the use of additional hose clips. The push-on connectors are made of black polyamide 6 or polyamide 12 containing 30% glass fibre reinforcement. The connectors can be supplied with O-rings on request.





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## **NORMA Group**

Postfach 1149 · D-63461 Maintal  
Edisonstraße 4 · D-63477 Maintal  
Germany

Tel.: +49 (6181) 4 03-0

Fax.: +49 (6181) 4 03-210

[www.normagroup.com](http://www.normagroup.com)

[info@normagroup.com](mailto:info@normagroup.com)