

STANDARD**■ Federal Mil A-A-59326A**

The standard for cam & groove couplings is based on the US Military Specification Mil-C-27487. The Mil-C-27487 specified the casting methods, materials, dimensions, tolerances, pressure ratings and inspection procedures. In 1998, the original Mil-C-27487 specification was replaced by a new Federal Military standard: A-A-59326A. Federal Mil A-A-59326A guarantees interchangeability of couplings designed to the same specification.

Interchangeability with other brands

Between manufacturers cam & groove couplings are interchangeable with the exception of 1/2" (12.7 mm), 5" (127 mm) and 8" (203.2 mm).

The A-A-59326A Mil-specification does not apply to 1/2", 5" and 8" cam & groove couplings, due to the presence of two versions of cam & groove couplings in today's market.

Limitations: Hose shanks with larger serrations are not designed to be assembled with a ferrule or sleeve. Hose damage can result if they are swaged. The larger shank serrations will cut into the inner wall of the hose resulting in leakage or permanent hose failure.

N.B.: Cam & groove couplings must never be used for steam or compressed air applications.

■ EN 14420-7

The European standard EN 14420-7 was approved by CEN in September 2004, and was applied to cam & groove couplings manufactured to American "military specification" MIL-C-27487 / A-A-59326A. This American standard does not apply to the connection side, but only to the coupling side. Other parts like levers, bolts, rings and seals are not standardized.

Cam & groove couplings produced to EN 14420-7 are interchangeable with those produced to the original MIL-C-27487 standard, but differ in terms of hose tail design, thread, part number etc. A flat thread seal has been added to the female threaded parts, and a smooth hose shank complying with EN 14420-2 / DIN 2817 has been added for assembly with RK safety clamps complying with EN 14420-3 / DIN 2817.

N.B.: European standard EN 14420-7 replaces DIN 2828 but does not replace MIL-C-27487 and Federal Mil A-A-59326A.

■ DIN 2828

Couplings produced to DIN 2828 are interchangeable with those produced to the original MIL-C-27487 standard, but differ in terms of hose tail design, thread, part number etc. A flat thread seal has been added to the female threaded parts, and a smooth hose shank complying with EN14420-3/ DIN 2817 has been added for assembly with RK safety clamps complying with EN 14420-3/DIN 2817.



OPERATION

To connect

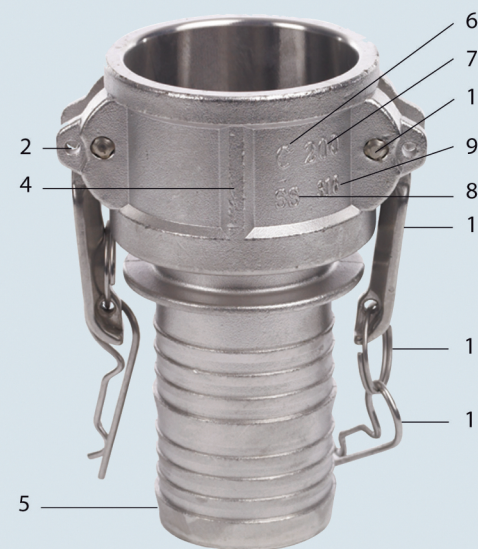
1. Open the coupler by pulling back the locking lever above the cam handles, whilst rotating the handles away from the body of the coupler.
2. Insert the adaptor into the coupler
3. Close the coupler by rotating the cam handles towards the body of the coupler. Locking occurs when the cam handles are closed. The coupler is properly closed when the locking levers on both the cam handles assemblies are flush. For extra security, insert safety clip through the holes above the cam handles. Line pressure, which moves the coupler and adaptor independently, increases the pressure on the cam face, ensuring increased locking leverage. Under normal conditions, safety locks are not necessary, but are recommended. The adaptor and the coupler are designed to minimize the fluid turbulence and the abrasion from dry products when connected.



To disconnect

4. Be sure that the hose-coupling connection is depressurized before disconnecting.
5. Open the coupler by pulling back the locking lever above the cam handles, whilst rotating the handles away from the body of the coupler.
6. Remove the adaptor from the coupler.
7. Close the coupler by rotating the cam handles towards the body of the coupler. Locking the coupler when not in use will help protect it from accidental damage.

FEATURES



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1. Stainless steel triangular handles, pin, ring and safety pin are standard on all material versions. Handles are manufactured by investment casting.
2. Holes for safety pin inserts
3. Earthing lug
4. Reinforced coupling section for increased mechanical strength
5. Long hose shank to ensure secure fixing
6. Marked with cam & groove type
7. Marked with diameter
8. Marked with standard compliance: MS (Military Specification) or DIN/EN (Deutsche Industrienorm)
9. Marked with material identification: stainless steel, brass, bronze, aluminium, polypropylene
10. Seals are available in NBR (standard), EPDM (standard for polypropylene), PTFE, CSM, FPM, FEP/Silicone, PTFE/EPDM and PTFE/FPM
11. Safety couplers are available with monoblock safety body
12. Coupling insurance by brand name LMC-Couplings®

APPLICATION

Cam & groove couplings are used for hose-to-hose or hose-to-pipe / manifold connections for the transfer of liquids or dry bulk products.



WORKING PRESSURE

INCH	1/2" -2"		2.1/2"		3"		4"		5"		6"		8"	
Working pressure	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
Brass	18	250	11	150	9	125	7	100	5	75	5	75	-	-
Bronze	18	250	11	150	9	125	7	100	-	-	-	-	-	-
Aluminium	18	250	11	150	9	125	7	100	5	75	5	75	3	50
Stainless steel	18	250	11	150	9	125	7	100	5	75	5	75	3	50
Polypropylene	7	100	-	-	4	50	4	50	-	-	-	-	-	-

TEMPERATURE RANGE

The working pressures shown above refer to ambient temperatures using elastomer seals. Higher temperatures and / or PTFE seals will reduce the rated coupling pressure. In the case of polypropylene, the maximum working temperature is 70°C / 160°F, at which temperature the working pressures shown above should be reduced by 40%.
Hose, coupling, seal and assembly method must be chosen in relation with the desired application and temperature range.

MATERIAL

■ Coupling

- LMC-Couplings cam & groove couplings are available in the following materials:
- Stainless steel: AISI 316 - EN 1.4401
 - Brass: C85700
 - Bronze: C84400
 - Aluminium: 380
 - Polypropylene: LMC's polypropylene cam & groove couplings contain 25-30% fibreglass reinforcements

Production method

All sizes of brass and bronze cam & groove couplings are shell-moulded or sand cast.
The type of aluminium is a sand cast 713-T5 alloy, which can be anodised if required.
Stainless steel couplings are investment-cast in a range of common sizes and are electro-polished for clean applications.
The stainless steel quality for cam & groove couplings is standard AISI 316-EN 1.4401.
Polypropylene couplings are made from polypropylene reinforced with 25%-30% acid-resistant fibreglass.



Materials and sizes

INCH ND	1/2" 13	3/4"-2" 20-50	2.1/2" 65	3"-4" 75-100	5"-6" 125-150	8" 200
Brass	■	■	■	■	■	-
Bronze	-	■	■	■	■	-
Aluminium	■	■	■	■	■	■
Stainless steel	■	■	■	■	■	■
Polypropylene	■	■	-	■	-	-
Saflok/Bleedoff	-	■	■	■	-	-

- Available
- Not available

Material

■ Seal

Standard seal

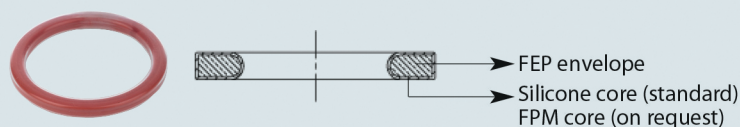
The standard cam & groove seal consists of a standard square-section, available in:



NBR - Silicone free (standard for all materials, except polypropylene)
EPDM (standard for material polypropylene)
FPM
CSM

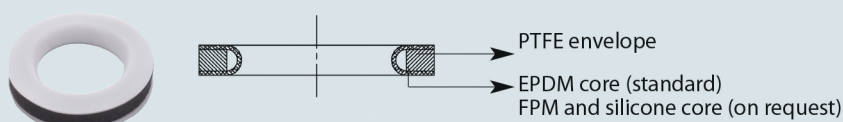
Closed seal

VLXPSG closed cam & groove seals are designed for extreme chemical applications. These seals combine the best properties of two different materials; the pressure set of the rubber silicone core and the chemical resistance provided by the FEP encapsulation. Encapsulation of the Silicone core ensures improved operational safety, when compared with an open envelope seal. VLXPSG seals are produced without the use of animal derived ingredients, ADI free. This reduces the risk of BSE prion contamination. VLXPSG closed cam & groove seals resist high temperature operation: from -60°C / -76°F up to 204°C / 399°F.



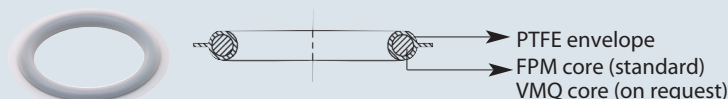
Open envelope seal

The open envelope seal consists of a U-section PTFE envelope and a square-section EPDM core. The construction method used for the open envelope seal ensures excellent compression properties. The PTFE envelope allows the seal to withstand temperatures up to 200°C / 382°F.



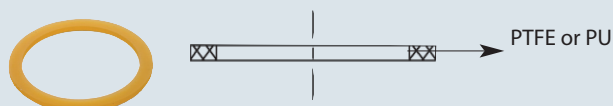
Closed envelope seal

The closed envelope seal removes all contact between chemicals and the seal core. The fully-closed PTFE envelope completely encapsulates the FPM. The maximum temperature for this type is 200°C / 392°F.



Thread seal

Female threaded coupler and adaptor components complying with EN 14420-7 / DIN 2828 standards contain a thread seal. Female threaded cam & groove couplings are sealed by screwing a male BSPT / BSP thread up to the thread seal. Thread seals are available in: PTFE - PU



Properties seals

REF.	ASTM	POLYMER	TRADE NAME	HARDNESS	°C	°F	+	PROPERTIES	-
VLXB...	NBR	Acrylonitrile Butadiene	Perbunan®	60 +/- 5 Shore A	-30°C 120°C	-22°F 248°F	Oil based hydraulic fluid, fats, animal and vegetable oils, flame retardant, liquids, grease, water and air	Ozone, sunlight weather	
VLXE...	EPDM	Ethylene-propylene-Diene Rubber	Keltan®	70 +/- 5 Shore A	-40°C 145°C	-40°F 293°F	Acids, steam, alcohol	Oil, greases	
VLXV...	FPM	Fluorocarbon	Viton®	70 +/- 5 Shore A	-30°C 200°C	-22°F 392°F	Mineral oils and greases, alifatic, aromatic, and also special chlorinated hydrocarbons, petrol, diesel fuels, silicon oils and greases	Steam	
VLXH...	CSM	Chlorosulfonated polyethylene	Hypalon®	70 +/- 5 Shore A	-40°C 140°C	-40°F 284°F	Acids and oils, obsolescent and ozone resistant	Chlorine	
VLXPSG...	FEP / VMQ	Copolymer of Hexa-fluoropropylene / Silicone	Teflon® / Silicone	60 +/- 5 Shore D	-60°C 204°C	-76°F 399°F	Resistant to almost all kinds of chemical products, steam, oils... Excellent self-lubricating and anti adhesive properties	Hardness	
VLXP...	PTFE / EPDM	Poly tetrafluoroethylene /	Teflon® / Keltan®	85 +/-5 Shore D	-25°C 100°C	-13°F 212°F	Alcohols, acids	Hardness Oil, greases	
VLXP...V	PTFE / FPM	Poly tetrafluoroethylene / Fluorocarbon	Teflon® / Viton®	85 +/-5 Shore D	-10°C 200°C	14°F 392°F	Mineral oils and greases, alifatics, aromatics	Low temp.	
VLXPG...	PTFE / FPM	Poly tetrafluoroethylene / Fluorocarbon	TFM™ / Viton®	74 +/- 5 Shore D	-15°C 200°C	-5°F 392°F	Acids and oils, obsolescent and ozone resistant petrol	Benzene, toluene,	

NBR= Perbunan® is a registered trademark of Bayer AG / EPDM= Keltan® is a registered trademark of DSM / FPM= Viton® is a registered trademark of DuPont Performance Elastomer
 CSM= Hypalon® is a registered trademark of DuPont Performance Elastomer / PTFE = Teflon® is a registered trademark of DuPont Performance Elastomer
 VMQ = Silplus® is a registered trademark of General Electric Co / TFM™ is a registered trademark of Dyneon.

ASSEMBLY

Worm drive clamps

RK safety clamps to EN14420-3 / DIN 2817

RKP safety clamps to EN14420-3 / DIN 2817

FLEXOLINE® safety clamps

Welding: butt welding and socket welding (see pg. A.1.27)

THREADS

Three different types of thread are generally used for cam & groove couplings:

- BSP = British Standard Pipe
- BSPT = British Standard Pipe Taper
- NPT = National Pipe Taper

In Europe, BSP and BSPT threads are more commonly used than NPT threads. NPT threads are typically American threads. Since many American industrial machines and products are exported to European markets, couplings with NPT threads are a regular requirement. The main difference between the three thread types referred to above is the seal method used. Although BSP threads are sealed using a seal or o-ring, BSPT and NPT threads are sealed by their conical thread.

THREAD	DESCRIPTION	STANDARD	TYPICAL CALL OUT	SEALING METHOD	PROPERTIES
BSP	British standard pipe	EN ISO 228-1 DIN ISO 228-1	G1	■ Parallel thread ■ Pressure tight joint is obtained with a seal or o-ring	■ 55° degree thread angle ■ Truncation of root and crest are round ■ Diameter measured in inches
BSPT	British standard pipe taper	EN 10226-1 DIN 2999-1	R1	■ Conical thread. ■ Pressure tight joint is achieved by the thread	■ 55° degree thread angle ■ Truncation of root and crest are round
BSPP	British standard pipe parallel		G 1 (cyl)	■ Cylindrical thread ■ Truncation of root and crest are round	■ 55° degree thread angle
NPT	National pipe taper (American standard pipe thread)	ANSI B 1.20.1	NPT 1	■ Conical thread ■ Pressure tight joint is achieved by the thread	■ 60° degree round angle ■ Truncation of root and crest are flat

Cam & groove threads

COUPLING	TYPE	STANDARD	ON REQUEST
ADAPTOR			
Female threaded	A	BSP EN ISO 228-1/ DIN ISO 228-1	NPT ANSI B 1.20.1
Male threaded	F	BSPT EN 10226-1 / DIN 2999-1	NPT ANSI B 1.20.1
COUPLER			
Female threaded	D	BSP EN ISO 228-1/ DIN ISO 228-1	NPT ANSI B 1.20.1
Male threaded	B	BSPT EN 10226-1 / DIN 2999-1	NPT ANSI B 1.20.1

TESTING

The following aspects of LMC's cam & groove couplings are tested in house:

- Adaptor and coupler dimensions
- Material quality
- Handle strength
- Seal properties
- Thread dimensions
- Impact resistant

■ Adaptor and coupler dimensions

High-technology measuring equipment

High-technology measuring tools are used to measure the specific dimensions of cam & groove couplings to ensure compliance with the dimensions required under the Federal Mil A-A-59326A, European EN 14420-7 and the German DIN 2828 standards. Although ordinary measuring systems are unable to give sufficiently precise dimensions for this purpose, our high-technology measuring system is able to measure complex cam & groove coupling product positions and shapes.



Dimension gauges

The shape of the adaptor coupling enables the interchangeability of coupler parts. Specially designed gauges are used in addition to measurement systems. The use of test gauges minimises inspection times, ensures interchangeability and maintains seal properties when using specially-designed seals, such as envelope seals.

Two gauges are used for each dimension; one small and the other larger. In the first stage of testing, the small gauge is passed across the head of the adaptor section. If the gauge can not pass, the adapter head falls within the permissible – (minus) tolerances.

If the larger gauge passes across the adaptor head with no interruption, the component is compliant and its dimensions fall within the permissible + (plus) tolerances.



■ Material quality

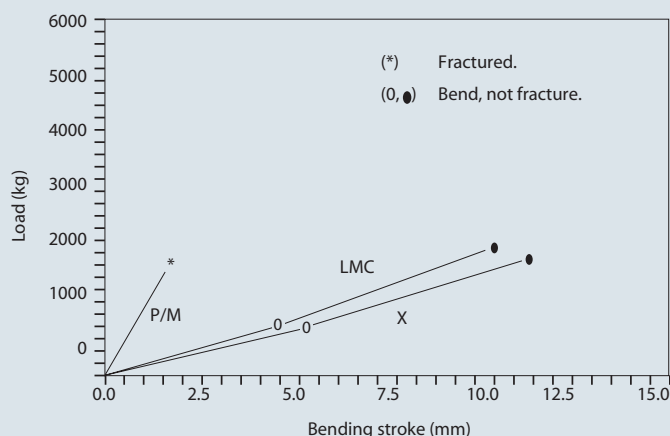
An in-house spectroscope is used to identify the materials used in the cam & groove couplings. The spectroscope analyses the precise quantity of all materials of the coupling.

We can therefore offer our customers a guarantee that the materials used comply fully with the relevant standard.



■ Handle strength

LMC handles are designed to resist a wide range of applications in many industries. All standard handles are investment-cast and triangular in section. The production method and triangular section guarantees excellent mechanical properties. The wear resistance of this material was tested using a Rockwell hardness tester. LMC handles achieve better test results than sintered handles. Sintered handles begin to fracture when subjected to a load of 1600 Kg, LMC handles do not even start to bend until subjected to a load of 1000 Kg. Even when subjected to a load of 2400 Kg, LMC cam & groove handles still show no sign of fracture.



Bend investment cast LMC handle



Fractured sintered handle

■ Seal properties

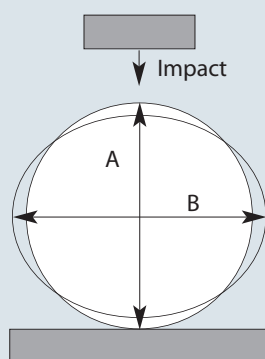
After chemical structure, seal compression set has the next most significant effect on the seal of cam & groove couplings. A seal of correct hardness will ensure that the cam & groove coupling is sealed properly and safely. Cam & groove seal hardness is tested using a durometer.

■ Thread dimensions

All cam & groove threads are tested using thread gauges. Our production site has gauges for all dimensions and all standards.

■ Impact resistance

Impact resistance tests were carried out on 3" and 4" aluminium couplers and nine other brands in order to test the mechanical strength of LMC cam & groove couplings. A 2.3 kg / 5 lbs weight was dropped from a height of 1.5 metres / 5 feet, and the impact on the coupler body measured.



Drop weight impact on bowl of coupler

Original ID: A
ID after impact: B

BRAND	PRODUCTION METHOD
E	Gravity cast
F	Gravity cast
G	Sand cast
H	High pressure die cast
I	High pressure die cast
J	Squeeze die cast
K	High pressure die cast
LMC	High pressure die cast
M	High pressure die cast

Size 3"														
Type	C	C	C	C	C	C	C	B	B	C	C	D	C	
Brand	E	F	G	H	H	I	J	K	K	K	K	K	LMC	
Original ID A	92.14	91.72	91.98	92.21	92.01	92.53	91.98	92.24	92.42	92.74	92.58	92.15	93.54	
Impact times B	1	91.75	89.43	89.86	91.06	91.67	90.98	91.16	91.43	91.12	91.48	91.59	91.31	93.17
	2	91.38	88.65		90.57	90.54	90.08	89.57	91.00	90.43	90.68	91.20	90.75	92.57
	3	90.73			90.54	90.27	89.06	88.66	90.26	90.30	90.28	91.11	90.38	92.57
	4	90.56			90.25	90.09			90.12	89.28		90.68	90.30	92.35
	5				90.16	90.05			89.83			90.65	89.78	92.19
	6				90.11	90.00						90.47	89.72	91.92
	7					89.55							89.49	91.89
	8					89.35							89.44	91.87
	9					89.37							89.33	91.79
	10					89.33								91.77
	11					89.22								91.76
	12					89.14								91.55
	13													91.68
	14													91.58
	15													91.58
	16													91.65
	17													91.61
	18													91.19
	19													91.15
	20													91.18
	21													91.08
	22													90.58
	23													90.05

Measurements in mm

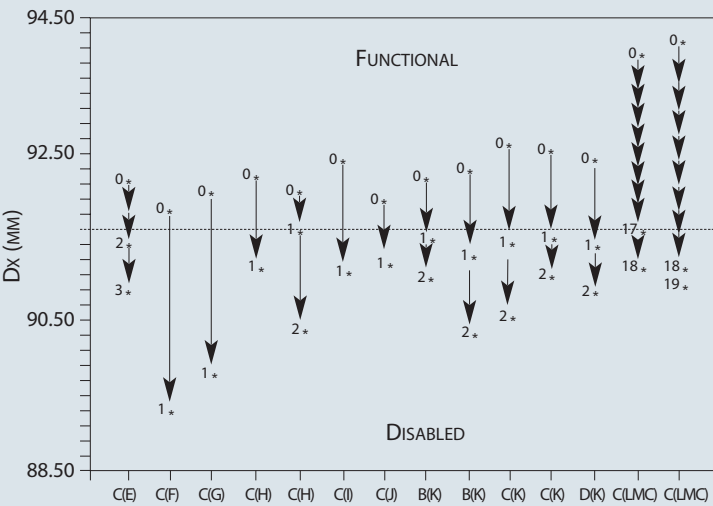
- Adaptor unable to fit in coupler
- Coupler cracked

Test result

The impact resistance test showed that the product quality of cam & groove couplings is variable. Nine couplers from different manufacturers were also tested.

Four brands of adaptor were unable to fit the corresponding coupler following a single impact from a 2.3 kg / 5 lbs weight dropped from a height of 1.5 metres / 5 feet. However, it took 18 such impacts before LMC-Couplings couplers were unable to fit their adaptors.

The average number of impacts required before fractures became aparent was 4.25. LMC-Couplings couplers resisted 23 impacts before showing signs of fracture;a result far in excess of the average value.



COATINGS

Sometimes standard cam & groove coupling materials, like stainless steel, are not sufficiently resistant to extremely aggressive chemicals. However, at LMC-Couplings, our couplings feature high-resistance coatings, such as:

- ECTFE
- PTFE
- PFA

✂ ECTFE (up to 1000μ)

ECTFE (Ethylene chlorotrifluoroethylene) coatings are designed to resist highly-concentrated and aggressive chemicals. Couplings with an ECTFE-coating show excellent electric isolating and fire properties and resist to temperatures up to 150°C / 300°F.

✂ PFA (up to 200μ)

The key quality of a PFA (Perfluoroalkoxy) coating is the temperature resistance up to 260°C / 500°F. Their effective anti-adhesive layer makes PFA coatings particularly well-suited to food and pharmaceutical industry applications.

✂ PTFE (up to 40μ)

PTFE (Poly tetrafluoroethylene) coatings are only 40μ thick. PTFE-coated couplings can withstand temperatures up to 290°C / 550°F. Like PFA-coated couplings, PTFE couplings have excellent anti-adhesive qualities and are suitable for food industry applications.

✂ PVDF (up to 800μ)

Like ECTFE coatings, PVDF (Polyvinylidene fluoride) coatings can resist highly-concentrated and aggressive chemicals, but with the added advantage of high temperature resistance. These couplings are wear-proof and also suitable for food industry applications.

PTFE liner

LMC-Couplings is able to provide his customers PTFE lined couplings. Our PTFE facility has been specially built to meet the highest industrial requirements. This room is separated from our other production facilities to ensure a clean and dust-free working environment. PTFE lined couplings are used in the pharmaceutical, cosmetics and food industry for applications with a temperature range of maximum 290°C / 550°F. Please contact our sales department for further information.



ACCESSORIES

All LMC-Couplings, cam & groove couplings (stainless steel, brass, bronze, aluminium and polypropylene)* as standard are supplied with stainless steel investment-cast triangular-section handles. Stainless steel provides the best chemical resistance. Their triangular section and investment-casting production method improves the mechanical strength of the handle.

Even greater security and safety is ensured by LMC’s cam & groove couplings with patented safety handles. Simply push the nut on the handle downwards and the coupling connection is sealed. The safety version of LMC’s cam & groove couplings can be made extra-secure by using the safety pin, as on all standard LMC-Couplings cam & groove couplings.

Where dust caps (type DC) are used to terminate hose or pipe assemblies, LMC’s lockable handles offer even higher safety levels. These patented L-shaped handles are physically locked, so that the dust cap can only be removed by unlocking the handles with a key.

* With exception of 8"



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Handle types

TYPE HANDLE	MATERIAL	REFERENCE	1/2"	3/4"	1"	1.1/4"	1.1/2"	2"	2.1/2"	3"	4"	5"	6"	8"
Investment-cast triangular handle standard	Stainless steel	VLHRPR	■	■	■	■	■	■	■	■	■	■	■	■
Investment-cast triangular handle	Brass	VLHRPM	-	-	■	■	■	■	-	■	■	-	-	-
Safety locking handle	Stainless steel	VLHRPR S	-	-	-	-	■	■	-	■	■	-	-	-
Cap L-handle	Stainless steel	VLHRPR L	-	-	-	■	■	■	■	■	■	■	■	-

- available
- not available

8" aluminium with 4 handles
4" polypropylene with 3 handles



CROSS REFERENCES

Cam & groove couplings

COUPLING	TYPE	DESCRIPTION	EN REFERENCE	COMMON USED REF.
	A	Adapter, female threaded Federal Mil	-	633-ABS
	AF	Adapter, female threaded EN 14420-7 / DIN 2828 with thread seal	AF	633-ABSF
	B	Coupler, male threaded EN 14420-7 / Federal Mil	BF	633-BB
	C	Coupler, with serrated hose shank Federal Mil	-	633-C
	CC	Coupler, with hose shank EN 14420-7 / DIN 2828	CC	633-CC
	D	Coupler, female threaded Federal Mil	-	633-DBS
	DF	Coupler, female threaded EN 14420-7 / DIN 2828 with thread seal	DF	633-DBSF
	E	Adapter, with serrated hose shank Federal Mil	-	633-E
	EC	Adapter, with smooth hose shank EN 14420-7 / DIN 2828	EC	633-EC
	F	Adapter, male threaded Federal Mil / EN 14420-7	FF	633-FB
	K	Female dust cap Federal Mil / EN 14420-7	DC	634-B
	P	Male dust plug Federal Mil / EN 14420-7	DP	634-A

Cam & groove coupling

Material

A: Aluminium
 B: Bronze
 M: Brass
 P: Polypropylene
 R: Stainless steel

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Size

-: Federal Mil A-A-59326A
 D: EN 14420-7 / DIN 2828
 S: With safety handles
 SD: EN 14420-7 / DIN 2828 with safety handles
 N: NPT thread
 SAF: Saflok version
 SAFBO: Saflok Bleed off version

Cam & groove seals

Cam & groove coupling

Seal

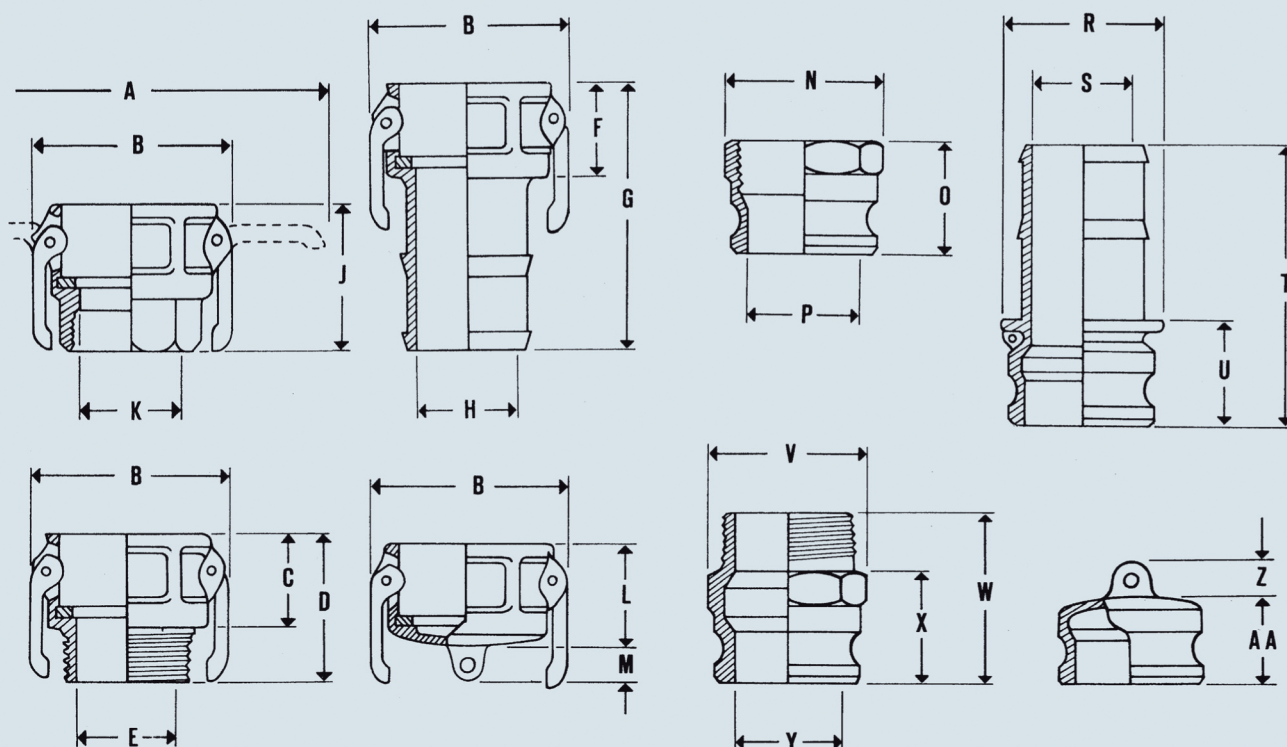
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Size

Material

B: NBR square seal
 E: EPDM square seal
 V: FPM square seal
 H: CSM square seal
 P: PTFE / EPDM open envelope seal
 PG: PTFE / FPM closed envelope seal
 PSG: FEP / Silicone closed square seal

DIMENSIONS



ALUMINIUM

ND	Inch	A	B	C	D	E	F	G	H	J	K	L	M
13	1/2"	67,00	38,50	29,80	46,80	12,00	32,00	72,60	13,70	46,70	26,80	32,00	14,25
19	3/4"	110,60	52,60	32,50	50,50	17,50	32,50	83,50	20,50	50,50	33,00	32,50	9,50
25	1"	136,00	62,20	39,00	61,00	24,10	39,00	98,00	27,00	61,00	40,00	39,00	9,50
32	1.1/4"	182,60	80,20	42,40	68,60	33,00	43,00	101,10	32,50	68,30	52,00	44,00	12,00
38	1.1/2"	190,20	87,80	46,00	68,50	38,00	46,00	109,00	39,60	68,50	56,00	47,70	8,70
50	2"	199,60	97,20	52,00	75,50	49,00	52,00	124,00	51,80	75,50	67,00	54,00	8,70
63	2.1/2"	212,30	109,90	57,00	87,50	62,70	54,00	138,00	65,00	89,80	83,70	54,00	12,00
75	3"	252,30	137,10	56,50	89,60	75,00	56,50	160,00	78,00	89,60	98,00	59,40	9,20
100	4"	280,30	165,00	58,00	94,00	101,00	58,00	168,00	102,50	94,00	125,00	61,60	9,50
125	5"	306,10	191,10	61,00	103,00	125,00	61,00	181,00	129,60	103,00	152,00	63,90	16,00
150	6"	414,50	240,00	65,00	105,00	149,50	65,00	216,00	155,00	105,00	180,90	66,00	18,00
200	8"	465,20	293,60	68,00	118,00	198,00	68,00	242,00	204,80	118,00	234,00	74,50	8,00

ND	Inch	N	O	P	R	S	T	U	V	W	X	Y	Z	AA
13	1/2"	27,00	41,70	13,80	-	13,90	71,00	38,00	26,90	60,50	41,70	13,40	9,70	31,00
19	3/4"	34,00	40,00	21,00	34,00	20,50	86,60	35,60	34,00	58,00	40,00	20,99	13,00	26,00
25	1"	40,00	47,60	23,80	40,00	27,00	130,60	44,60	40,00	59,60	37,60	29,00	13,00	33,00
32	1.1/4"	49,00	58,00	30,50	50,00	34,10	109,10	52,80	49,50	81,90	56,50	30,15	12,20	42,00
38	1.1/2"	56,00	54,80	36,30	60,00	39,60	115,50	52,50	55,00	77,50	55,00	36,30	12,80	38,00
50	2"	67,00	61,20	45,60	68,00	51,80	132,00	60,00	67,00	85,30	61,80	45,60	13,30	47,70
63	2.1/2"	83,20	84,00	59,00	82,00	65,00	147,50	63,50	83,80	101,40	71,00	59,00	18,00	53,00
75	3"	98,00	69,20	73,70	100,00	78,00	168,00	64,50	95,00	102,20	69,00	73,70	14,00	51,50
100	4"	125,00	76,40	98,20	130,00	102,50	179,60	69,60	123,00	112,50	77,20	98,20	14,80	53,40
125	5"	152,00	82,00	125,20	154,00	129,60	190,50	70,50	150,00	124,00	82,00	125,30	16,60	60,40
150	6"	195,00	78,60	150,00	183,00	155,00	224,50	73,50	193,50	104,50	76,00	150,00	30,00	59,00
200	8"	236,00	118,00	119,50	232,00	204,80	253,00	79,00	236,00	163,00	113,00	119,50	8,00	58,00

Dimensions in mm and are given as illustration only.

POLYPROPYLENE

ND	Inch	A	B	C	D	E	F	G	H	J	K	L	M
13	1/2"	66,40	37,70	33,00	53,00	12,50	33,00	73,60	15,00	53,00	29,00	34,50	11,00
13-19	1/2"-3/4"	110,30	53,30	33,00	53,00	12,50	33,00	73,60	15,00	53,00	29,00	-	-
19	3/4"	110,30	53,30	33,00	55,00	17,50	33,00	84,00	21,50	54,00	35,20	34,80	11,00
25	1"	130,80	61,90	39,00	62,00	22,00	39,00	100,00	27,00	61,00	40,60	41,10	11,50
32	1.1/4"	181,30	82,60	46,00	72,00	30,00	46,00	109,40	33,50	70,00	51,00	48,60	13,60
38-32	1.1/4"-1.1/2"	180,20	83,30	47,00	73,00	30,00	47,00	110,40	33,50	71,00	51,00	-	-
38	2.1/2"	180,20	83,30	46,00	72,00	35,80	46,00	112,80	39,20	71,00	60,00	48,80	13,50
50	2"	189,50	94,20	53,00	86,00	47,00	53,00	140,50	52,80	81,00	69,00	56,30	12,00
75	3"	245,00	128,10	59,00	99,00	70,00	59,00	162,60	78,50	95,00	102,00	65,20	16,00
100	4"	272,20	159,40	59,00	101,00	95,00	59,00	168,70	104,30	99,00	129,00	65,20	16,00

ND	Inch	N	O	P	R	S	T	U	V	W	X	Y	Z	AA
13	1/2"	29,00	46,60	12,10	27,00	15,00	78,20	37,60	27,00	59,60	39,60	12,10	11,00	27,70
13-19	1/2"-3/4"	35,20	41,60	16,50	35,00	15,00	78,20	37,60	35,20	61,60	41,60	16,50	-	-
19	3/4"	35,20	47,60	19,00	35,00	21,50	88,60	37,60	35,20	63,60	41,60	18,90	11,60	28,00
25	1"	41,00	48,60	23,00	40,00	27,00	107,60	46,60	40,00	71,60	48,60	22,80	13,40	35,20
32	1.1/4"	51,00	67,00	27,50	650,00	33,50	116,90	53,50	51,00	81,00	55,00	27,90	15,00	42,00
38-32	1.1/4"-1.1/2"	56,00	56,50	35,20	50,00	33,50	118,40	55,00	56,00	82,50	56,50	35,20	-	-
38	2.1/2"	60,00	67,50	35,80	57,00	39,20	121,80	55,00	39,20	82,50	56,50	35,80	14,70	43,80
50	2"	70,00	77,00	45,50	68,00	52,80	149,50	62,00	68,00	97,00	63,00	45,50	14,20	50,80
75	3"	101,00	91,40	70,40	98,00	78,50	173,10	69,50	98,00	111,20	71,20	70,40	15,20	64,80
100	4"	129,00	96,50	96,00	128,00	104,30	180,70	71,00	129,00	113,70	71,70	96,00	14,80	57,70

STAINLESS STEEL

ND	Inch	A	B	C	D	E	F	G	H	J	K	L	M
13	1/2"	67,00	38,50	31,00	46,20	11,50	31,45	80,00	14,20	47,00	26,60	32,50	13,50
19	3/4"	110,60	52,60	32,50	49,90	19,00	32,50	92,50	21,20	49,90	33,40	33,60	7,50
25	1"	136,00	62,20	38,50	59,80	24,20	38,50	107,60	27,00	59,80	38,60	39,70	8,00
32	1.1/4"	182,60	80,20	42,40	63,70	32,50	42,40	115,00	33,20	63,70	47,60	48,90	8,40
38	1.1/2"	190,20	87,80	45,20	67,60	38,50	45,20	121,30	39,60	67,60	55,00	46,90	8,50
50	2"	199,60	97,20	51,60	75,40	49,60	56,10	139,30	52,80	75,40	66,00	53,70	8,50
63	2.1/2"	212,30	109,90	53,00	86,00	65,00	52,20	149,50	65,00	85,00	82,00	54,50	8,80
75	3"	252,30	137,10	56,10	89,10	75,50	56,10	173,00	78,50	89,10	96,00	59,00	9,40
100	4"	280,30	165,00	56,40	93,40	101,00	56,40	180,00	103,80	93,40	124,00	60,40	12,00
125	5"	306,10	191,10	61,00	103,00	126,00	61,00	187,50	129,60	103,00	152,00	68,60	15,00
150	6"	414,50	240,00	64,00	107,00	149,00	84,00	243,00	154,50	103,00	180,00	64,00	16,00
200	8"	467,40	286,80	68,00	118,00	199,00	68,00	243,00	205,00	118,00	234,00	74,40	7,00

ND	Inch	N	O	P	R	S	T	U	V	W	X	Y	Z	AA
13	1/2"	26,30	42,30	13,50	23,80	14,20	72,00	39,00	25,20	57,00	40,50	13,45	13,75	29,00
19	3/4"	33,40	37,90	21,50	35,00	21,20	86,00	36,00	33,40	53,80	36,50	21,50	13,10	25,60
25	1"	38,60	46,60	24,20	39,00	27,00	103,80	44,80	38,60	68,60	47,00	24,20	13,20	33,20
32	1.1/4"	47,60	52,70	28,20	48,00	33,20	113,90	51,90	47,60	74,70	53,40	28,20	13,20	39,60
38	1.1/2"	55,00	54,70	36,40	56,60	39,60	119,70	55,70	55,00	77,40	54,40	36,40	13,10	41,30
50	2"	65,40	61,50	46,00	68,00	52,80	135,90	60,90	65,40	84,00	60,70	46,00	12,80	48,00
63	2.1/2"	82,00	81,70	56,60	82,00	65,00	144,70	61,70	80,00	99,70	67,70	59,60	13,20	49,20
75	3"	95,40	69,50	73,30	98,00	78,80	167,40	64,90	95,40	100,90	67,90	73,30	13,10	51,60
100	4"	124,00	77,70	98,40	127,00	103,80	174,50	67,50	122,00	112,00	74,90	98,40	16,80	54,40
125	5"	152,00	82,00	123,30	154,00	129,60	192,50	72,50	150,00	124,00	82,00	125,30	17,80	59,20
150	6"	189,50	82,00	150,00	178,50	154,70	254,00	77,00	189,00	126,30	83,30	149,80	24,70	56,50
200	8"	234,00	108,00	197,00	232,00	205,00	254,00	79,00	232,00	138,00	88,00	197,00	28,00	58,00

BRASS

ND	Inch	A	B	C	D	E	F	G	H	J	K	L	M
13	1/2"	67,00	38,50	30,20	46,20	13,30	30,20	66,20	14,60	46,20	26,00	31,60	14,40
19	3/4"	110,60	52,60	32,60	49,90	19,00	32,60	82,60	21,20	49,90	33,40	33,70	7,50
25	1"	136,00	62,20	38,50	59,80	24,20	38,50	973,50	27,00	59,80	38,60	39,70	7,50
32	1.1/4"	182,60	80,20	42,30	63,60	32,50	42,30	104,30	33,20	63,60	47,60	43,80	8,40
38	1.1/2"	190,20	87,80	45,20	67,20	38,50	45,20	109,20	39,60	67,20	55,40	46,90	8,50
50	2"	199,60	97,20	51,60	74,80	49,00	51,60	129,60	52,80	74,80	65,40	53,50	9,00
63	2.1/2"	212,30	109,90	52,20	83,40	62,00	53,20	136,20	65,00	83,40	78,80	54,60	9,00
75	3"	252,30	137,10	56,10	89,10	76,00	56,10	158,10	78,60	89,10	95,40	58,80	9,00
100	4"	280,30	165,00	56,40	93,40	104,00	56,40	163,40	103,80	93,40	124,00	60,00	9,00
125	5"	306,10	191,10	57,00	95,70	128,80	59,50	186,70	129,50	92,50	147,30	59,00	19,00
150	6"	414,50	240,00	65,50	105,90	153,40	64,60	230,00	153,50	109,50	180,00	63,50	28,00

ND	Inch	N	O	P	R	S	T	U	V	W	X	Y	Z	AA
13	1/2"	26,00	37,50	19,30	25,20	14,60	68,50	32,50	26,00	53,10	36,50	19,30	10,30	25,00
19	3/4"	33,40	37,90	26,20	35,00	21,20	86,00	36,00	33,70	55,20	37,90	26,20	15,10	25,60
25	1"	38,60	46,50	29,00	39,00	27,00	103,70	44,70	38,00	66,50	45,20	29,00	14,30	33,00
32	1.1/4"	47,60	52,70	35,20	48,00	33,20	113,90	51,90	47,60	73,70	52,40	35,20	13,40	39,60
38	1.1/2"	55,40	54,20	42,80	56,00	39,60	116,50	52,50	55,40	75,30	53,30	42,80	15,60	41,80
50	2"	65,40	61,40	52,40	71,00	52,80	137,40	59,40	65,00	83,80	60,60	52,40	16,20	48,80
63	2.1/2"	78,80	65,70	64,60	82,00	65,00	144,40	61,40	77,70	95,80	64,50	64,60	17,00	49,30
75	3"	95,40	69,50	81,20	98,00	78,60	164,80	62,80	93,50	101,50	68,50	81,20	16,50	51,40
100	4"	124,00	77,50	109,30	125,00	103,80	174,40	67,40	122,00	113,00	76,00	109,30	10,00	53,10
125	5"	148,00	78,80	128,80	148,00	128,30	189,70	63,10	148,50	115,20	78,50	128,80	19,00	51,20
150	6"	182,50	83,80	154,80	181,00	156,80	245,00	81,60	183,00	120,50	80,60	153,70	30,20	61,60

DIMENSIONS

