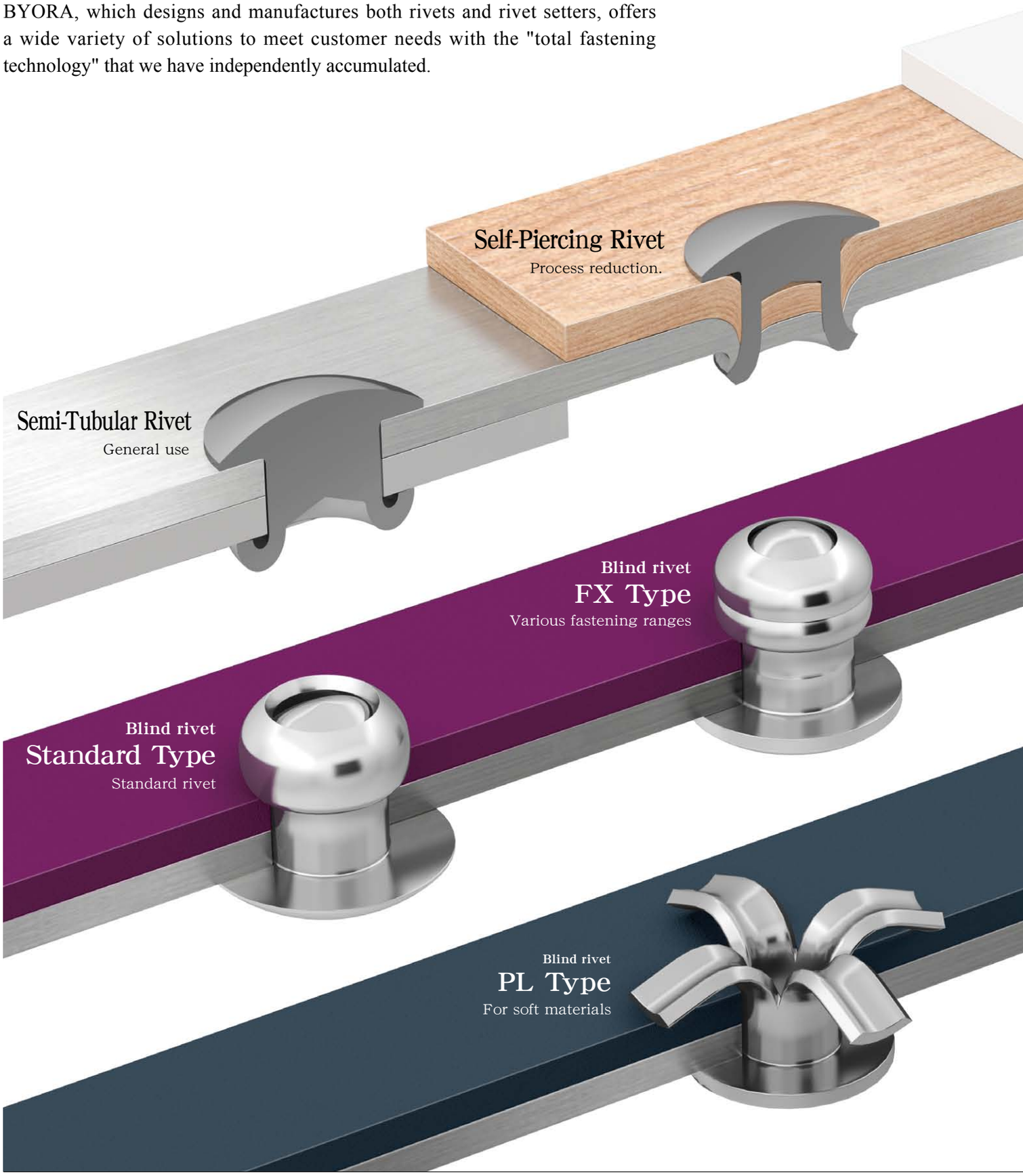
FASTENER GENERAL CATALOGUE

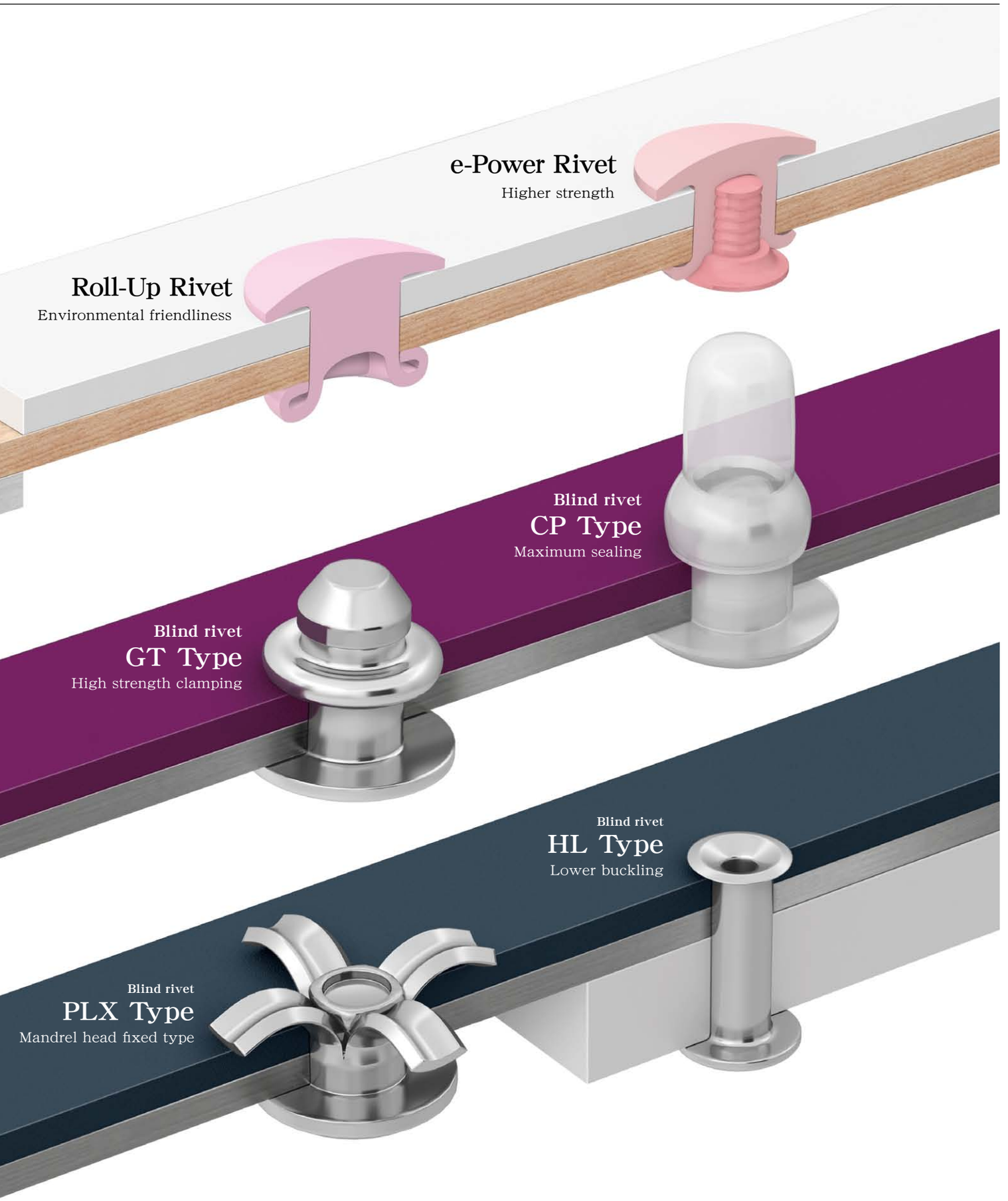
FUKUI BYORA
METAL PARTS INNOVATOR

50 years' experience of manufacturing rivets:

"Fukui Byora's Fastener Series" leads the industry with total fastening technology.

Since our founding, FUKUI BYORA's fastening technology has been developed and honed by various customer needs and various usage environments. FUKUI BYORA, which designs and manufactures both rivets and rivet setters, offers a wide variety of solutions to meet customer needs with the "total fastening technology" that we have independently accumulated.

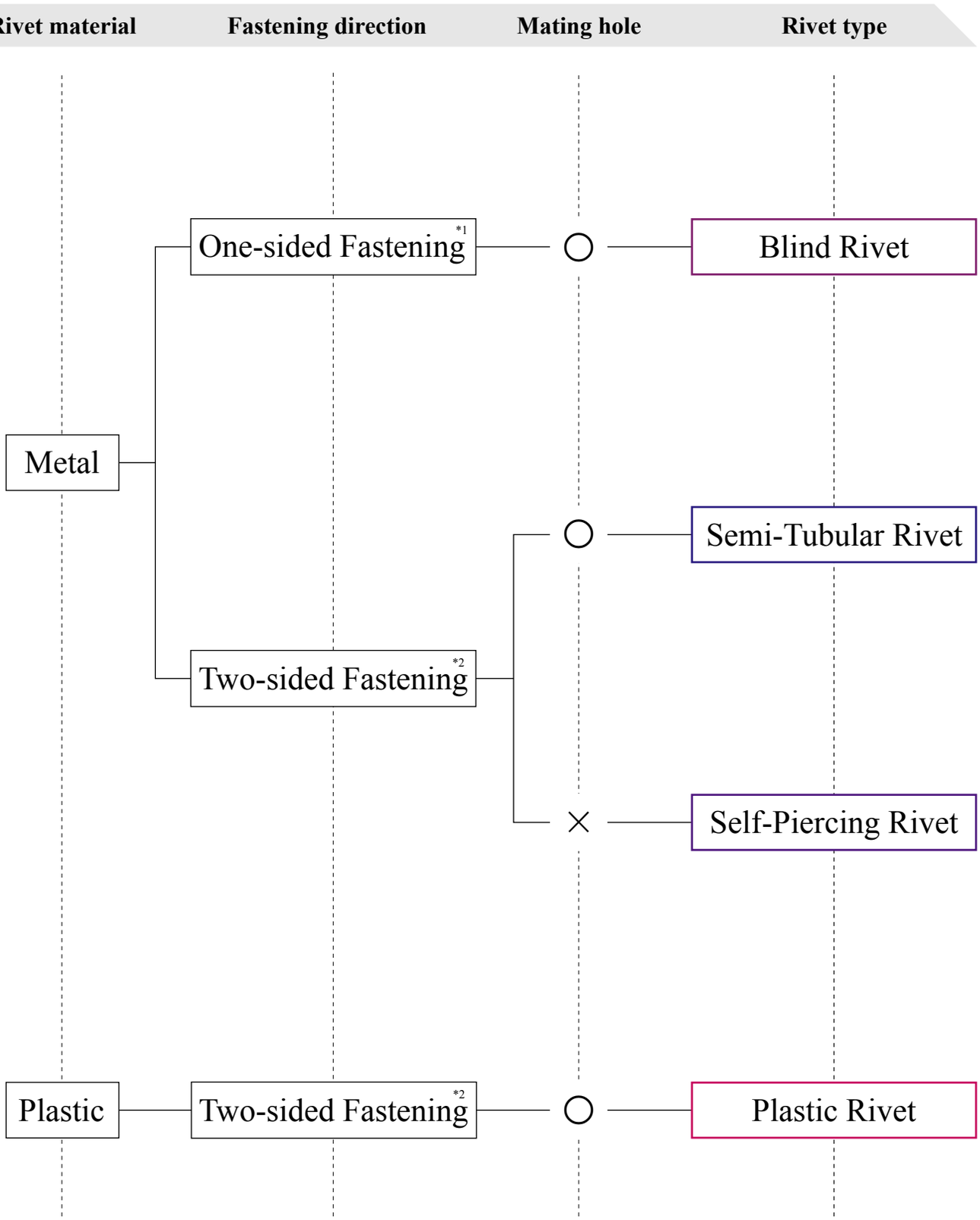




Please choose one that best suits your needs from our extensive product line.

SELECTION FLOW CHART

Choose a rivet that best suits your application.



*1. One-sided fastening is accomplished by working on only one side of the assembly.

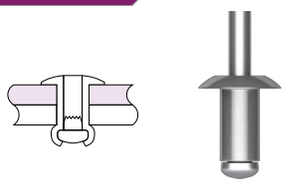
*2. Two-sided fastening is accomplished by working on both sides of the materials using a fastening jig.

All the products above are compliant with RoHS/ELV:SOC6. (except for rivet setter)

In this brochure, the materials to be fastened are referred to as base materials or workpieces. Fastening and riveting may be used interchangeably.

Please do not make any modifications to the products (surface treatment, heat treatment, changes to the dimensions etc.), as they may cause the fastening defects. If you wish to change the specifications, please consult with us in advance.

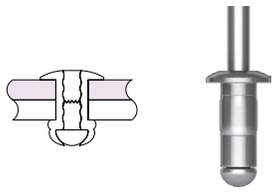
Blind rivet



Standard Type

Standard rivet

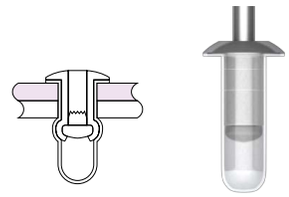
Blind rivet most commonly used for multiple application in various industries. It is globally recognized as a standard fastener.



FX Type

Various fastening ranges

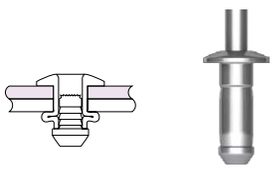
The rivet in one size fits a wide range of material thicknesses. It is characterized by bright finish and high strength clamping.



CP Type

Maximum sealing

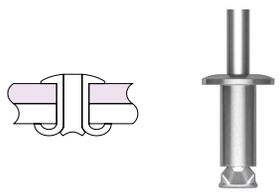
The rivet provides maximum air sealed fastening, thanks to its plastic cap. It also prevents galvanic corrosion between different metals.



GT Type

High strength clamping

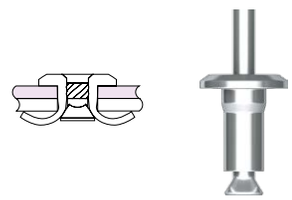
The large-diameter fastens the workpieces tightly together.



PL Type

For soft materials

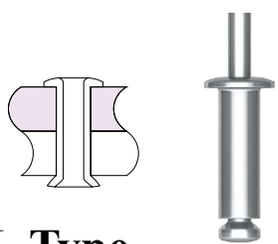
The sleeve spreads widely in four petal-like parts that fasten the materials together. It is mainly used to fasten soft materials, such as plywood and plastic.



PLX Type

Mandrel head fixed type

Fastening the fixed mandrel head will reduce abnormal noise and stop running water

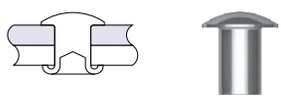


HL Type

Lower buckling

By maintaining the height of the buckling side low, different design variations are available.

Semi-tublular rivet

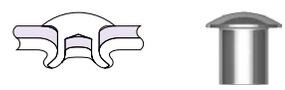


Semi-Tubular Rivet

General use

Secure and uniform fastening.

Self-piercing rivet

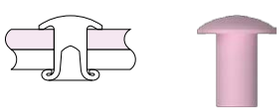


Self-Piercing Rivet

Process reduction.

The rivet pierces through the materials while fastening them together. A work hole does not need to be made in advance.

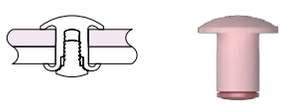
Plastic rivet



Roll-Up Rivet

Environmental friendliness

The plastic, semi-tubular rivet is fastened at normal temperature and is environmentally friendly. Various colors are available.

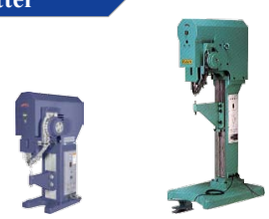


e-Power Rivet

Higher strength

It has twice the fastening strength of the roll-up rivet.

Rivet setter



Rivet Setter

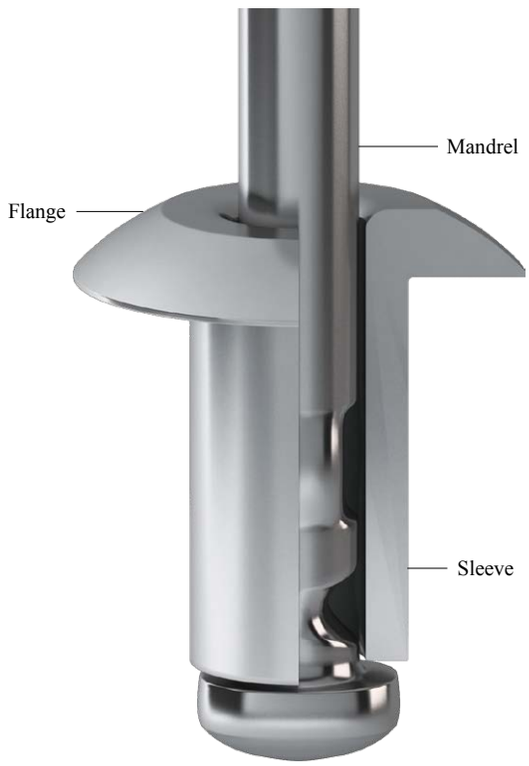
Power saving

Fukui Byora's rivet setter with an automatic rivet feeder as standard equipment will dramatically improve efficiency in fastening work.

BLIND RIVET

Easy, secure and speedy fastening from one side of base materials

Structure of blind rivet



Features

Easy, secure and speedy fastening

A blind rivet is very easy to fasten even for a novice. The rivet can be fastened easily, securely, and utilizing a lightweight hand tool.

Fastened with access to only one side of assembly

A blind rivet can fasten workpieces together with access to only one side of each of them. The ideal application in which to use a blind rivet is when the rear side of the mating piece is not accessible with a jig or when the product is sealed up, or is large or hard to handle.

Reliable fastening

A blind rivet is very high in fastening reliability and used for various uses in various industries. It securely fastens dissimilar materials low in weldability, such as aluminum and iron.

Reduction in initial investment

Using an inexpensive hand tool, the initial investment is low

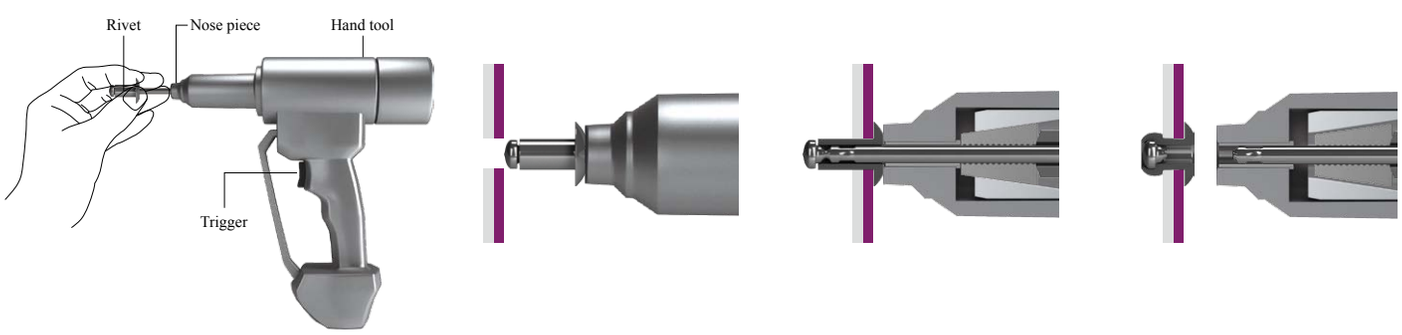
Fastening process

① Attach the rivet to the hand tool.

② Insert the rivet into the mating hole.

③ Press the tool against the workpieces and pull the trigger.

④ Fastening is complete.



Handling precautions

1. Selection of hand tool

Choose a hand tool that meets the required fastening capability with the size and material of the blind rivet used.
Choose a suitable tool, otherwise, it may result in improper fastening.

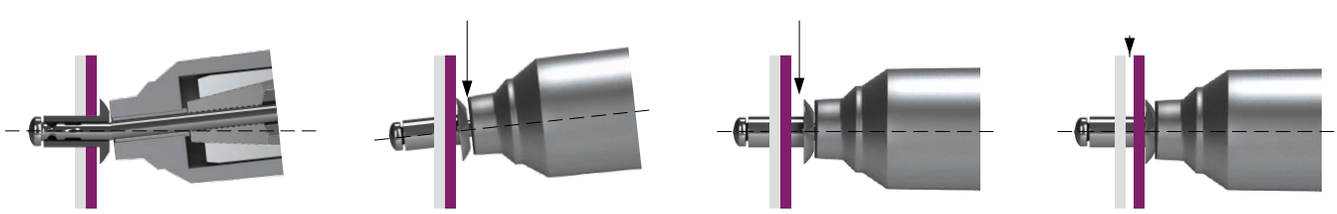
2. If the rivet is installed in the situations below, it may result in improper fastening or malfunction of the hand tool.

(1) The tool is tilted.

(2) The rivet is oblique to the workpiece.

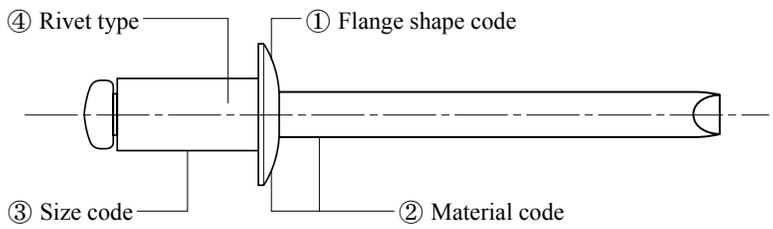
(3) There is a gap between the rivet head and the workpiece.

(4) There is a gap between the workpieces.



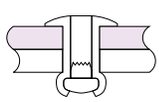
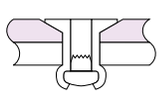
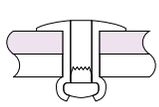
Product coding system

D AS 53 □□
① ② ③ ④



① Flange shape code : See Table 1 (D: Round head, K: Countersunk and LF: Large flange).
② Material code : See Table 2 (*AS: Aluminum sleeve and steel mandrel).
③ Size code : See the appropriate specification table.
④ Rivet type : See Table 3 (FX/GT/CP/PL/PLX/HL) (* No code for standard type).

Flange shape code (Table 1)

Code	Type	Shape	Features
D	Round head		Standard flange shape
K	Countersunk		The rivet head is flush with the surface of one of the mating parts.
LF	Large flange		The flange diameter is large. It is suitable for soft materials.

Material code (Table 2)

Code	Sleeve material	Mandrel material
AS	Aluminum A5154 / A5052	Hard steel wire
AA	Aluminum A5052	High-tensile aluminum wire
SS	Steel SWCH	Hard steel wire
CS	Austenitic stainless steel	Hard steel wire
CC	Austenitic stainless steel	High-tensile stainless steel wire
AC	Aluminum A5154	High-tensile stainless steel wire

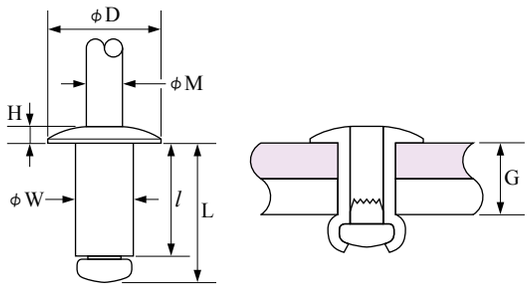
Rivet type (Table 3)

Type	Features
Standard	Blind rivet most commonly used in various industries.
FX	The rivet in one size fits a wide range of material thicknesses.
GT	The large-diameter curls pull the workpieces tightly.
CP	The rivet provides highly airtight fastening, thanks to its plastic cap.
PL	The sleeve spreads widely in four petal-like parts that fasten the materials. It is mainly used to fasten soft materials.
PLX	Fastening the fixed mandrel head will reduce abnormal noise and stop running water.
HL	By maintaining the height of the buckling side low, different design variations are available.

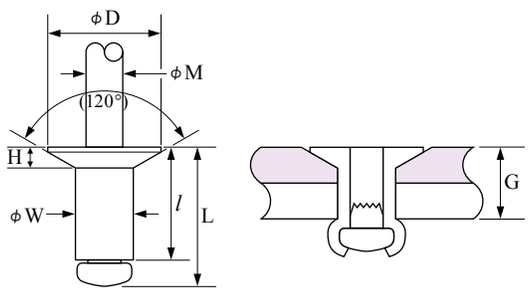
Standard Type / Standard rivet (Round head・Countersunk)

Blind rivet most commonly used for multiple application in various industries. It is globally recognized as a standard fastener.

Symbols of standard dimensions and installation diagram



(Round head)



(Countersunk)

Product code

D AS 53
① ② ③

① Flange shape code (D: Round head and K: Countersunk)
② Material code (AS, AA, SS, CS and CC * See the specification table.)
③ Size code (* See the specification table.)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)		l (mm)	L*1 (mm)	D (mm)	H (mm)		M (mm)	Strength*2 (kN)	
			Round head	Countersunk				Round head	Countersunk		Tensile	Shear
2.4	2.5 +0.1 0	32	0.5 ~ 3.2	1.1 ~ 3.2	5.7	7.5	4.7	0.8	0.9	1.5	0.61	0.44
		33	3.2 ~ 4.8	3.2 ~ 4.8	7.3	9.1						
		34	4.8 ~ 6.4	—	8.9	10.7			—			
		35	6.4 ~ 8.0	—	11.0	12.8						
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	1.3 ~ 1.6	4.9	7.0	6.4	1.0	1.1	1.85	1.34	0.90
		42	1.6 ~ 3.2	1.6 ~ 3.2	6.5	8.6						
		43	3.2 ~ 4.8	3.2 ~ 4.8	8.1	10.2						
		44	4.8 ~ 6.4	4.8 ~ 6.4	9.7	11.8						
		45	6.4 ~ 8.0	6.4 ~ 8.0	11.3	13.4						
		46	8.0 ~ 9.6	8.0 ~ 9.6	12.9	15.0						
		47	9.6 ~ 11.2	9.6 ~ 11.2	15.4	17.5						
		48	11.2 ~ 12.8	11.2 ~ 12.8	17.1	19.2						
4.0	4.1 +0.1 0	52	1.0 ~ 3.2	1.6 ~ 3.2	7.3	9.9	8.0	1.2	1.4	2.25	2.17	1.53
		53	3.2 ~ 4.8	3.2 ~ 4.8	8.9	11.5						
		54	4.8 ~ 6.4	4.8 ~ 6.4	10.5	13.1						
		55	6.4 ~ 8.0	6.4 ~ 8.0	12.1	14.7						
		56	8.0 ~ 9.6	8.0 ~ 9.6	13.7	16.3						
		57	9.6 ~ 11.2	9.6 ~ 11.2	15.3	17.9						
		58	11.2 ~ 12.8	11.2 ~ 12.8	16.9	19.5						
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	1.8 ~ 3.2	8.1	10.9	9.5	1.5	1.6	2.65	3.10	2.12
		63	3.2 ~ 4.8	3.2 ~ 4.8	9.7	12.5						
		64	4.8 ~ 6.4	4.8 ~ 6.4	11.3	14.1						
		65	6.4 ~ 8.0	6.4 ~ 8.0	12.9	15.7						
		66	8.0 ~ 9.6	8.0 ~ 9.6	14.5	17.3						
		67	9.6 ~ 11.2	9.6 ~ 11.2	16.1	18.9						
		68	11.2 ~ 12.8	11.2 ~ 12.8	17.7	20.5						
		610	12.8 ~ 16.0	12.8 ~ 16.0	21.2	24.0						
		612	16.0 ~ 19.2	16.0 ~ 19.2	24.4	27.2						
6.4	6.5 +0.1 0	82	1.6 ~ 3.2	—	9.7	13.5	12.8	1.7	—	3.82	4.95	3.23
		84	3.2 ~ 6.4	3.2 ~ 6.4	12.9	16.7			2.5			
		86	6.4 ~ 9.6	6.4 ~ 9.6	16.1	19.9						
		88	9.6 ~ 12.8	9.6 ~ 12.8	19.3	23.1						
		812	12.8 ~ 19.2	12.8 ~ 19.2	25.7	29.5						

*1.The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

AA specification table

AA (Sleeve: Aluminum A5052 / fabric, Mandrel: High-tensile aluminum wire / fabric)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)		*l* (mm)	L*1 (mm)	D (mm)	H (mm)		M (mm)	Strength*2 (kN)	
			Round head	Countersunk				Round head	Countersunk		Tensile	Shear
2.4	2.5 +0.1 0	32	1.6 ~ 3.2	1.1 ~ 3.2	5.5	7.3	4.7	0.8	0.9	1.6	0.36	0.31
		34	3.2 ~ 6.4	3.2 ~ 6.4	9.0	10.8						
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	1.3 ~ 1.6	5.2	7.2	6.4	1.0	1.1	2.0	0.91	0.66
		42	1.6 ~ 3.2	1.6 ~ 3.2	6.0	8.0						
		43	3.2 ~ 4.8	3.2 ~ 4.8	7.6	9.6						
		44	4.8 ~ 6.4	4.8 ~ 6.4	9.2	11.2						
		45	6.4 ~ 8.0	6.4 ~ 8.0	10.7	12.7						
		46	8.0 ~ 9.6	8.0 ~ 9.6	12.3	14.3						
		48	9.6 ~ 12.8	9.6 ~ 12.8	16.2	18.2						
4.0	4.1 +0.1 0	52	1.0 ~ 3.2	1.6 ~ 3.2	6.6	9.2	8.0	1.2	1.4	2.6	1.39	0.96
		53	3.2 ~ 4.8	3.2 ~ 4.8	8.2	10.8						
		54	4.8 ~ 6.4	4.8 ~ 6.4	9.7	12.3						
		56	6.4 ~ 9.6	6.4 ~ 9.6	12.9	15.5						
		58	9.6 ~ 12.8	9.6 ~ 12.8	16.1	18.7						
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	1.8 ~ 3.2	7.1	9.9	9.5	1.5	1.6	3.0	2.11	1.46
		64	3.2 ~ 6.4	3.2 ~ 6.4	10.3	13.1						
		66	6.4 ~ 9.6	6.4 ~ 9.6	13.5	16.3						
		68	9.6 ~ 12.8	9.6 ~ 12.8	16.7	19.5						
		610	12.8 ~ 16.0	—	19.8	22.6			—			
6.4	6.5 +0.1 0	82	1.6 ~ 3.2	—	9.2	13.0	12.8	1.7	—	4.0	3.83	2.54
		84	3.2 ~ 6.4		12.6	16.4						
		86	6.4 ~ 9.6		16.6	20.4						
		88	9.6 ~ 12.8		20.5	24.3						
		812	12.8 ~ 19.2		26.0	29.8						

SS specification table

SS (Sleeve: Steel SWCH / trivalent chromate, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)		*l* (mm)	L*1 (mm)	D (mm)	H (mm)		M (mm)	Strength*2 (kN)	
			Round head	Countersunk				Round head	Countersunk		Tensile	Shear
2.4	2.5 +0.1 0	32	0.5 ~ 3.2	1.1 ~ 3.2	5.7	7.5	4.7	0.8	0.9	1.5	0.94	0.78
		33	3.2 ~ 4.8	3.2 ~ 4.8	7.3	9.1						
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	1.3 ~ 1.6	4.9	7.0	6.4	1.0	1.1	1.92	1.73	1.43
		42	1.6 ~ 3.2	1.6 ~ 3.2	6.5	8.6						
		43	3.2 ~ 4.8	3.2 ~ 4.8	8.1	10.2						
		44	4.8 ~ 6.4	4.8 ~ 6.4	9.7	11.8						
		45	6.4 ~ 8.0	6.4 ~ 8.0	11.3	13.4						
		46	8.0 ~ 9.6	8.0 ~ 9.6	12.9	15.0						
		47	9.6 ~ 11.2	9.6 ~ 11.2	14.5	17.5						
		48	11.2 ~ 12.8	11.2 ~ 12.8	16.4	19.2						
4.0	4.1 +0.1 0	52	1.0 ~ 3.2	1.6 ~ 3.2	7.3	9.9	8.0	1.1	1.4	2.42	2.84	2.0
		53	3.2 ~ 4.8	3.2 ~ 4.8	8.9	11.5						
		54	4.8 ~ 6.4	4.8 ~ 6.4	10.5	13.1						
		55	6.4 ~ 8.0	6.4 ~ 8.0	12.1	14.7						
		56	8.0 ~ 9.6	8.0 ~ 9.6	13.7	16.3						
		57	9.6 ~ 11.2	9.6 ~ 11.2	15.3	17.9						
		58	11.2 ~ 12.8	11.2 ~ 12.8	16.9	19.5						
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	1.8 ~ 3.2	8.1	10.9	9.5	1.5	1.6	2.94	4.37	3.35
		63	3.2 ~ 4.8	3.2 ~ 4.8	9.7	12.5						
		64	4.8 ~ 6.4	4.8 ~ 6.4	11.3	14.1						
		65	6.4 ~ 8.0	6.4 ~ 8.0	12.9	15.7						
		66	8.0 ~ 9.6	8.0 ~ 9.6	14.5	17.3						
		67	9.6 ~ 11.2	9.6 ~ 11.2	16.1	18.9						
		68	11.2 ~ 12.8	11.2 ~ 12.8	17.7	20.5						
		610	12.8 ~ 16.0	12.8 ~ 16.0	20.9	24.0						
		612	16.0 ~ 19.2	16.0 ~ 19.2	24.1	27.2						
6.4	6.5 +0.1 0	84	3.2 ~ 6.4	—	12.9	16.7	12.8	1.7	—	3.82	7.28	5.86
		86	6.4 ~ 9.6		16.1	19.9						
		88	9.6 ~ 12.8		19.3	23.1						
		812	12.8 ~ 19.2		25.7	29.5						

*1.The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

Standard Type / Standard rivet (Round head・Countersunk)

CS specification table

CS (Sleeve: Austenitic stainless steel / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)		*l* (mm)	L*1 (mm)	D (mm)	H (mm)		M (mm)	Strength*2 (kN)	
			Round head	Countersunk				Round head	Countersunk		Tensile	Shear
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	—	4.7	7.1	6.4	1.0	—	2.0	2.59	2.20
		42	1.6 ~ 3.2	1.6 ~ 3.2	6.8	9.2			1.1			
		43	3.2 ~ 4.8	3.2 ~ 4.8	8.6	11.0						
		44	4.8 ~ 6.4	4.8 ~ 6.4	10.2	12.6						
		46	6.4 ~ 9.6	—	13.7	16.1			—			
		48	9.6 ~ 12.8	—	19.0	21.4		0.9	—			
4.0	4.1 +0.1 0	52	1.6 ~ 3.2	1.8 ~ 3.2	7.1	10.5	8.0	1.3	1.6	2.5	4.04	3.48
		53	3.2 ~ 4.8	3.2 ~ 4.8	8.6	12.0						
		54	4.8 ~ 6.4	4.8 ~ 6.4	10.2	13.6						
		56	6.4 ～ 9.6	6.4 ~ 9.6	13.9	17.3						
		58	9.6 ~ 12.8	9.6 ~ 12.8	17.7	21.1						
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	—	7.1	10.5	9.5	1.7	—	3.0	5.41	4.44
		64	3.2 ~ 6.4	3.2 ~ 6.4	10.8	14.2			1.9			
		66	6.4 ~ 9.6	6.4 ~ 9.6	14.0	17.4						
		68	9.6 ~ 12.8	—	17.2	20.6			—			
		610	12.8 ~ 16.0	—	20.0	23.4			—			
		612	16.0 ~ 19.2	—	23.6	27.1		1.2	—			

CC specification table

CC (Sleeve: Austenitic stainless steel / fabric, Mandrel: High-tensile stainless steel wire / fabric)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)		*l* (mm)	L*1 (mm)	D (mm)	H (mm)		M (mm)	Strength*2 (kN)	
			Round head	Countersunk				Round head	Countersunk		Tensile	Shear
2.4	2.5 +0.1 0	32	0.5 ~ 3.2	—	6.0	7.8	4.7	0.8	—	1.48	1.48	1.40
		34	3.2 ~ 4.8		8.8	10.7						
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	1.3 ~ 1.6	4.7	7.1	6.4	1.0	1.1	2.0	2.59	2.20
		42	1.6 ~ 3.2	1.6 ~ 3.2	6.8	9.2						
		43	3.2 ~ 4.8	3.2 ~ 4.8	8.6	11.0						
		44	4.8 ~ 6.4	4.8 ~ 6.4	10.2	12.6						
		46	6.4 ~ 9.6	6.4 ~ 9.6	13.7	16.1						
		48	9.6 ~ 12.8	—	19.0	21.4		0.9	—			
4.0	4.1 +0.1 0	52	1.6 ~ 3.2	1.8 ~ 3.2	7.1	10.5	8.0	1.3	1.6	2.5	4.04	3.48
		53	3.2 ~ 4.8	3.2 ~ 4.8	8.6	12.0						
		54	4.8 ~ 6.4	4.8 ~ 6.4	10.2	13.6						
		56	6.4 ~ 9.6	6.4 ~ 9.6	13.9	17.3						
		58	9.6 ~ 12.8	9.6 ~ 12.8	17.7	21.1						
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	2.1 ~ 3.2	7.1	10.5	9.5	1.7	1.9	3.0	5.41	4.44
		64	3.2 ~ 6.4	3.2 ~ 6.4	10.8	14.2						
		66	6.4 ~ 9.6	6.4 ~ 9.6	14.0	17.4						
		68	9.6 ~ 12.8	9.6 ~ 12.8	17.2	20.6						
		610	12.8 ~ 16.0	12.8 ~ 16.0	20.0	23.4						
		612	16.0 ~ 19.2	16.0 ~ 19.2	23.6	27.1		1.2	—			

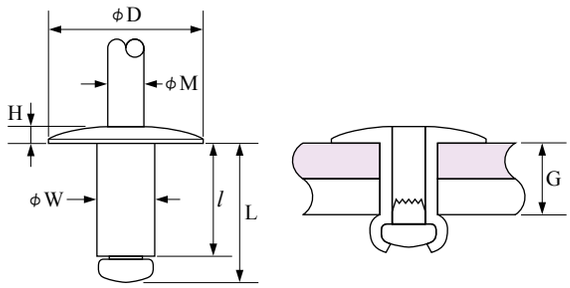
*1. The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

Remarks) (1) The steel mandrel is plated with zinc. For trivalent chromate plating, please ask us.
(2) The steel sleeve is plated with trivalent chromate.
(3) The rivets with the following specifications are made to order. (i) Long mandrel (ii) Painted head and (iii) Fastening range G exceeding 19.2 mm
(4) The standard dimensions are subject to change without notice.
(5) Please ask us when the required fastening range exceeds the recommended range or when it is near lower limit.

Standard Type / Standard rivet (Large flange[*1])

Standard blind rivet with a large flange.

Symbols of standard dimensions and installation diagram



(Large flange)

Product code

LF AS 53
① ② ③

① Flange shape code (LF: Large flange)
② Material code (AS, AA and SS * See the specification table.)
③ Size code (* See the specification table.)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L[*2] (mm)	D (mm)	H (mm) Large flange	M (mm)	Strength[*3] (kN) Tensile	Strength[*3] (kN) Shear
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	4.9	7.0	8.0 9.5	1.0 1.2	1.85	1.34	0.90
		42	1.6 ~ 3.2	6.5	8.6					
		43	3.2 ~ 4.8	8.1	10.2					
		44	4.8 ~ 6.4	9.7	11.8					
		45	6.4 ~ 8.0	11.3	13.4					
		46	8.0 ~ 9.6	12.9	15.0					
		47	9.6 ~ 11.2	15.4	17.5					
		48	11.2 ~ 12.8	17.1	19.2					
4.0	4.1 +0.1 0	52	1.0 ~ 3.2	7.3	9.9	10.0 12.0	1.3 1.5	2.25	2.17	1.53
		53	3.2 ~ 4.8	8.9	11.5					
		54	4.8 ~ 6.4	10.5	13.1					
		55	6.4 ~ 8.0	12.1	14.7					
		56	8.0 ~ 9.6	13.7	16.3					
		57	9.6 ~ 11.2	15.3	17.9					
		58	11.2 ~ 12.8	16.9	19.5					
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	8.1	10.9	12.0 13.0 15.5	1.7 1.8 2.0	2.65	3.10	2.12
		63	3.2 ~ 4.8	9.7	12.5					
		64	4.8 ~ 6.4	11.3	14.1					
		65	6.4 ~ 8.0	12.9	15.7					
		66	8.0 ~ 9.6	14.5	17.3					
		67	9.6 ~ 11.2	16.1	18.9					
		68	11.2 ~ 12.8	17.7	20.5					
		610	12.8 ~ 16.0	21.2	24.0					
		612	16.0 ~ 19.2	24.4	27.2					

*1. Large flange rivets are made to order. *2. The L lengths are given as guidelines. *3. The strength values are obtained through our own testing.

Standard Type / Standard rivet (Large flange[*1])

AA specification table

AA (Sleeve: Aluminum A5052 / fabric, Mandrel: High-tensile aluminum wire / fabric)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L[*2] (mm)	D (mm)	H (mm)	M (mm)	Strength[*3] (kN)	
							Large flange		Tensile	Shear
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	5.2	7.2	8.0 9.5	1.0 1.2	2.0	0.91	0.66
		42	1.6 ~ 3.2	6.0	8.0					
		43	3.2 ~ 4.8	7.6	9.6					
		44	4.8 ~ 6.4	9.2	11.2					
		45	6.4 ~ 8.0	10.7	12.7					
		46	8.0 ~ 9.6	12.3	14.3					
		48	9.6 ~ 12.8	16.2	18.2					
4.0	4.1 +0.1 0	52	1.0 ~ 3.2	6.6	9.2	9.5 12.0	1.2 1.5	2.6	1.39	0.96
		53	3.2 ~ 4.8	8.2	10.8					
		54	4.8 ~ 6.4	9.7	12.3					
		56	6.4 ~ 9.6	12.9	15.5					
		58	9.6 ~ 12.8	16.1	18.7					
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	7.1	9.9	13.0 15.5	1.8 2.0	3.0	2.11	1.46
		64	3.2 ~ 6.4	10.3	13.1					
		66	6.4 ~ 9.6	13.5	16.3					
		68	9.6 ~ 12.8	16.7	19.5					
		610	12.8 ~ 16.0	19.8	22.6					

SS specification table

SS (Sleeve: Steel SWCH / trivalent chromate, Mandrel: Hard steel wire / zinc plating)

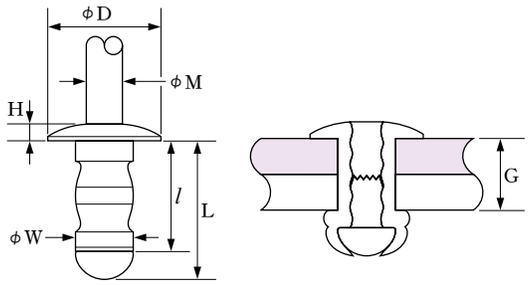
Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L[*2] (mm)	D (mm)	H (mm)	M (mm)	Strength[*3] (kN)	
							Large flange		Tensile	Shear
3.2	3.3 +0.1 0	41	0.5 ~ 1.6	4.9	7.0	8.0 9.5	1.0 1.2	1.92	1.73	1.43
		42	1.6 ~ 3.2	6.5	8.6					
		43	3.2 ~ 4.8	8.1	10.2					
		44	4.8 ~ 6.4	9.7	11.8					
		45	6.4 ~ 8.0	11.3	13.4					
		46	8.0 ~ 9.6	12.9	15.0					
		47	9.6 ~ 11.2	14.5	17.5					
		48	11.2 ~ 12.8	16.4	19.2					
4.0	4.1 +0.1 0	52	1.0 ~ 3.2	7.3	9.9	10.0 12.0	1.3 1.5	2.42	2.84	2.0
		53	3.2 ~ 4.8	8.9	11.5					
		54	4.8 ~ 6.4	10.5	13.1					
		55	6.4 ~ 8.0	12.1	14.7					
		56	8.0 ~ 9.6	13.7	16.3					
		57	9.6 ~ 11.2	15.3	17.9					
		58	11.2 ~ 12.8	16.9	19.5					
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	8.1	10.9	13.0 15.5	1.8 2.0	2.94	4.37	3.35
		63	3.2 ~ 4.8	9.7	12.5					
		64	4.8 ~ 6.4	11.3	14.1					
		65	6.4 ~ 8.0	12.9	15.7					
		66	8.0 ~ 9.6	14.5	17.3					
		67	9.6 ~ 11.2	16.1	18.9					
		68	11.2 ~ 12.8	17.7	20.5					
		610	12.8 ~ 16.0	20.9	24.0					
		612	16.0 ~ 19.2	24.1	27.2					

*1. Large flange rivets are made to order. *2. The L lengths are given as guidelines. *3. The strength values are obtained through our own testing.

FX Type / Various fastening ranges (Round head)

The rivet in one size fits a wide range of material thicknesses.
It is characterized by neat finish and high strength clamping.

Symbols of standard dimensions and installation diagram



(Round head)

Product code

D AS 503 FX
① ② ③ ④

① Flange shape code	(D: Round head)
② Material code	(AS and SS * See the specification table.)
③ Size code	(* See the specification table.)
④ Rivet type	(FX)

AS specification table

AS (Sleeve: Aluminum A5052 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
3.2	3.3 +0.1 0	401	0.8 ~ 4.7	8.1	10.2	6.4	1.0	1.92	1.0	0.7
		402	4.0 ~ 7.9	11.1	13.2					
4.0	4.1 +0.1 0	501	1.2 ~ 6.3	9.3	11.8	8.0	1.2	2.42	1.5	1.1
		502	4.0 ~ 9.5	13.0	15.5					
		503	6.4 ~ 12.7	18.0	20.5					
4.8	4.9 +0.1 0	601	1.6 ~ 6.4	10.5	13.4	9.5	1.5	2.94	2.5	1.7
		602	4.8 ~ 11.4	15.8	18.7					
		603	8.4 ~ 12.7	17.9	20.8					
		604	12.7 ~ 19.8	25.9	28.8					

SS specification table

SS (Sleeve: Steel SWCH / trivalent chromate, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
3.2	3.3 +0.1 0	401	0.8 ~ 4.7	8.1	10.2	6.4	1.0	2.02	1.3	1.1
		402	4.0 ~ 7.9	11.1	13.2					
4.8	4.9 +0.1 0	601	1.6 ~ 6.4	10.5	13.6	9.5	1.5	3.12	3.4	2.6
		602	4.8 ~ 11.4	15.8	18.9					
		603	8.4 ~ 12.7	17.9	21.0					
		604	12.7 ~ 19.8	25.9	29.0					

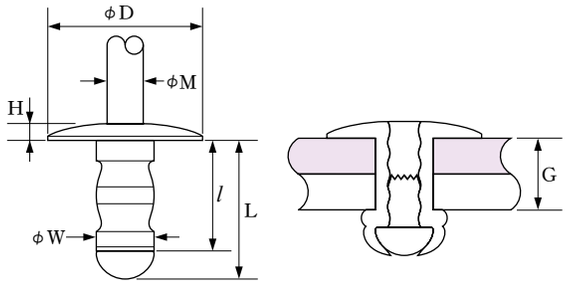
*1.The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

Remarks) (1) The steel mandrel is plated with zinc. For trivalent chromate plating, please ask us.
(2) The steel sleeve is plated with trivalent chromate.
(3) The standard dimensions are subject to change without notice.
(4) Please ask us when the required fastening range exceeds the recommended range or when it is near lower limit.

FX Type / Various fastening ranges (Large flange[*1])

The rivet in once size fits a wide range of material thicknesses, and the large flange firmly holds the workpieces in place.

Symbols of standard dimensions and installation diagram



(Large flange)

Product code

LF AS 503 FX
① ② ③ ④

① Flange shape code (LF: Large flange)
② Material code (AS and SS * See the specification table.)
③ Size code (* See the specification table.)
④ Rivet type (FX)

AS specification table

AS (Sleeve: Aluminum A5052 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L[*2] (mm)	D (mm)	H (mm)	M (mm)	Strength[*3] (kN)	
							Large flange		Tensile	Shear
3.2	3.3 +0.1 0	401	0.8 ~ 4.7	8.1	10.2	8.0	1.0	1.92	1.0	0.7
4.0	4.1 +0.1 0	501	1.2 ~ 6.3	9.3	11.8	12.0	1.5	2.42	1.5	1.1
		502	4.0 ~ 9.5	13.0	15.5					
		503	6.4 ~ 12.7	18.0	20.5					
4.8	4.9 +0.1 0	601	1.6 ~ 6.4	10.5	13.4	15.5	2.0	2.94	2.5	1.7
		602	4.8 ~ 11.4	15.8	18.7					

SS specification table

SS (Sleeve: Steel SWCH / trivalent chromate, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L[*2] (mm)	D (mm)	H (mm)	M (mm)	Strength[*3] (kN)	
							Large flange		Tensile	Shear
4.8	4.9 +0.1 0	601	1.6 ~ 6.4	10.5	13.6	15.5	2.0	3.12	3.4	2.6
		602	4.8 ~ 11.4	15.8	18.9					
		603	8.4 ~ 12.7	17.9	21.0					
		604	12.7 ~ 19.8	25.9	29.0					

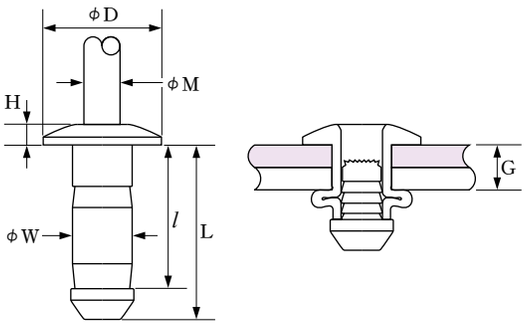
*1. Large flange rivets are made to order. *2. The L lengths are given as guidelines. *3. The strength values are obtained through our own testing.

Remarks) (1) The steel mandrel is plated with zinc. For trivalent chromate plating, please ask us.
(2) The steel sleeve is plated with trivalent chromate.
(3) The standard dimensions are subject to change without notice.
(4) Please ask us when the required fastening range exceeds the recommended range or when it is near lower limit.

GT Type / High strength clamping (Round head)

The large-diameter fastens the workpieces tightly together.

Symbols of standard dimensions and installation diagram



Product code

D CC 66 GT
① ② ③ ④

① Flange shape code (D: Round head)
② Material code (CC * See the specification table.)
③ Size code (* See the specification table.)
④ Rivet type (GT)

CC specification table

CC (Sleeve: Austenitic stainless steel / fabric, Mandrel: High-tensile stainless steel wire / fabric)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
4.8	4.9 +0.1 0	62	1.6 ~ 3.2	10.5	13	9.5	1.7	3.2	5.4	4.5
		64	3.2 ~ 4.8	12	14.5				5.4	4.5
		66	6.4 ~ 8.6	15	17.5				5.4	8.5

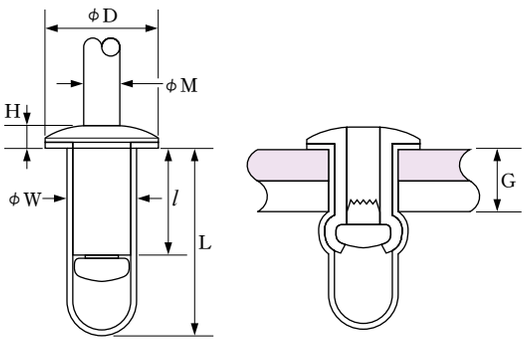
*1. The L lengths are given as guideline. *2. The strength values are obtained through our own testing.

Remarks) (1) The standard dimensions are subject to change without notice.
(2) Please ask us when the required fastening range exceeds the recommended range or when it is around the lower limit.

CP Type / Maximum sealing (Round head)

The rivet provides maximum air sealed fastening, thanks to its plastic cap.
It also prevents galvanic corrosion between different metals.

Symbols of standard dimensions and installation diagram



Product code

D AS 543 CP
① ② ③ ④

① Flange shape code	(D: Round head)
② Material code	(AS and AA * See the specification table.)
③ Size code	(* See the specification table.)
④ Rivet type	(CP)

Airtightness

There will be no water leakage under the pressure test conditions below.

Product	DAS543
Work hole diameter	4.1 mm
Pressurizing time	8 hours
Pressure	0.9 MPa

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
4.0	4.1 +0.1 0	541	1.0 ~ 1.6	4.6	12.0	6.4	1.3	1.85	1.1	0.9
		542	1.6 ~ 3.2	6.2						
		543	3.2 ~ 4.8	7.8						

AA specification table

AA (Sleeve: Aluminum A5052 / fabric, Mandrel: High-tensile aluminum wire / fabric)

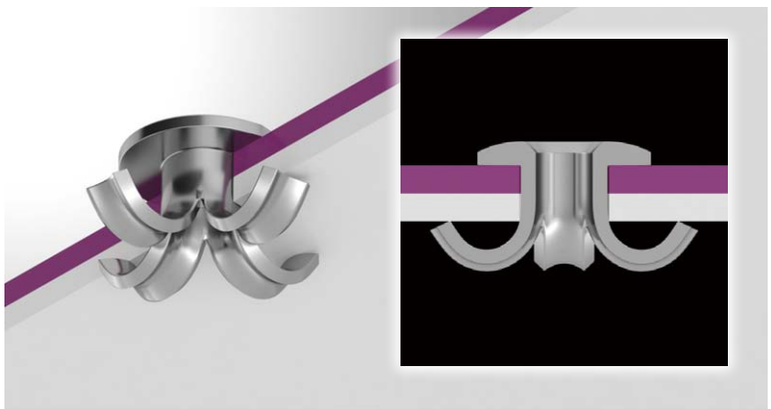
Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
4.0	4.1 +0.1 0	541	1.0 ~ 1.6	4.9	12.0	6.4	1.3	2	0.4	0.66
		542	1.6 ~ 3.2	5.7						
		543	3.2 ~ 4.8	7.3						

This product is made to order.
*1. The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

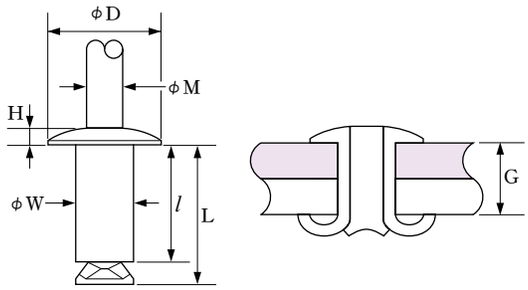
Remarks) (1) The steel mandrel is plated with zinc. For trivalent chromate plating, please ask us.
(2) The standard dimensions are subject to change without notice.
(3) Please ask us when the required fastening range exceeds the recommended range or when it is near lower limit.
(4) Due to the nature of the plastic cap, outdoor use is not recommended.

PL Type / For soft materials (Round head・Countersunk)

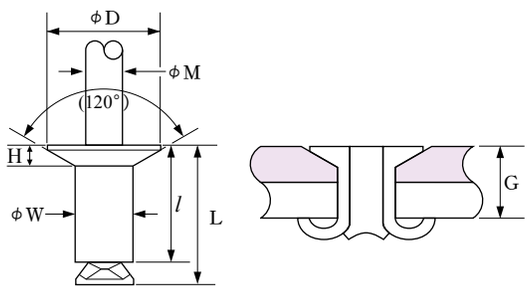
The sleeve spreads widely in four petal-like parts that fasten the materials together. It is mainly used to fasten soft materials, such as plywood and plastic.



Symbols of standard dimensions and installation diagram



(Round head)



(Countersunk)

Product code

D AS 53 PL
① ② ③ ④

① Flange shape code (D: Round head and K: Countersunk)
② Material code (AS * See the specification table.)
③ Size code (* See the specification table.)
④ Rivet type (PL)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)		l (mm)	L*2 (mm)	D (mm)	H (mm)		M (mm)	Strength*3 (kN)	
			Round head	Countersunk*1				Round head	Countersunk*1		Tensile	Shear
3.2	3.4 +0.1 0	43	1.0 ~ 4.5	1.3 ~ 4.5	8.1	10.1	6.4	1.0	1.1	1.85	0.8	0.8
		44	4.5 ~ 6.0	4.5 ~ 6.0	9.7	11.7						
		46	6.0 ~ 9.2	6.0 ~ 9.2	12.9	14.9						
		48	9.2 ~ 12.4	9.2 ~ 12.4	16.8	18.8						
4.0	4.2 +0.1 0	52	1.0 ~ 2.6	1.6 ~ 2.6	7.3	9.7	8.0	1.2	1.4	2.25	1.3	1.3
		53	1.2 ~ 4.5	2.0 ~ 4.5	8.9	11.3						
		54	4.5 ~ 6.1	4.5 ~ 6.1	10.5	12.9						
		56	6.1 ~ 9.3	6.1 ~ 9.3	13.7	16.1						
		58	9.3 ~ 12.5	9.3 ~ 12.5	16.9	19.3						
4.8	5.0 +0.1 0	63	1.5 ~ 4.6	1.8 ~ 4.6	9.7	12.4	9.5	1.5	1.6	2.65	2.0	2.1
		64	4.6 ~ 6.1	4.6 ~ 6.1	11.3	14.0						
		66	6.1 ~ 9.2	6.1 ~ 9.2	14.5	17.2						
		68	9.2 ~ 12.3	9.2 ~ 12.3	17.7	20.4						
		610	12.3 ~ 15.5	12.3 ~ 15.5	20.9	23.6						

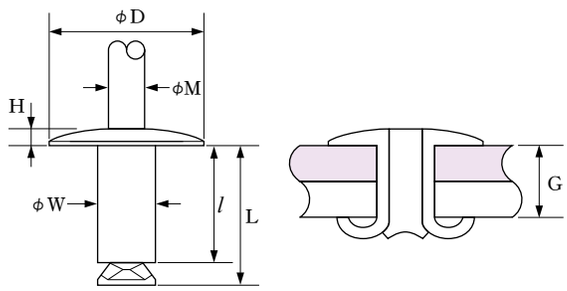
*1. Countersunk rivets are made to order. *2. The L lengths are given as guidelines. *3. The strength values are obtained through our own testing.

Remarks) (1) The mandrel is plated with zinc. (Zinc plating is recommended because of the capability of PL rivets.)
(2) The standard dimensions are subject to change without notice.
(3) Please ask us when the required fastening range exceeds the recommended range or when it is around the lower limit.

Warning Do not point the rivet setter at another person while riveting. (The mandrel may be broken and the head may fly out.)

PL Type / For soft materials (Large flange[*1])

Symbols of standard dimensions and installation diagram



(Large flange)

Product code

LF AS 53 PL
① ② ③ ④

① Flange shape code (LF: Large flange)
② Material code (AS * See the specification table.)
③ Size code (* See the specification table.)
④ Rivet type (PL)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L[*2] (mm)	D (mm)	H (mm) Large flange	M (mm)	Strength[*3] (kN) Tensile	Strength[*3] (kN) Shear
3.2	3.4 +0.1 0	43	1.0 ~ 4.5	8.1	10.1	8.0 9.5	1.0 1.2	1.85	0.8	0.8
		44	4.5 ~ 6.0	9.7	11.7					
		46	6.0 ~ 9.2	12.9	14.9					
		48	9.2 ~ 12.4	16.8	18.8					
4.0	4.2 +0.1 0	52	1.0 ~ 2.6	7.3	9.7	10.0 12.0	1.3 1.5	2.25	1.3	1.3
		53	1.2 ~ 4.5	8.9	11.3					
		54	4.5 ~ 6.1	10.5	12.9					
		56	6.1 ~ 9.3	13.7	16.1					
		58	9.3 ~ 12.5	16.9	19.3					
4.8	5.0 +0.1 0	63	1.5 ~ 4.6	9.7	12.4	12.0 13.0 15.5	1.7 1.8 2.0	2.65	2.0	2.1
		64	4.6 ~ 6.1	11.3	14.0					
		66	6.1 ~ 9.2	14.5	17.2					
		68	9.2 ~ 12.3	17.7	20.4					
		610	12.3 ~ 15.5	20.9	23.6					

*1. Large flange rivets are made to order. *2. The L lengths are given as guidelines. *3. The strength values are obtained through our own testing.

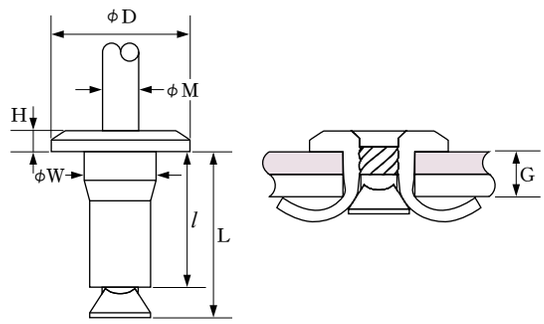
Remarks) (1) The mandrel is plated with zinc. (Zinc plating is recommended because of the capability of PL rivets.)
(2) The standard dimensions are subject to change without notice.
(3) Please ask us when the required fastening range exceeds the recommended range or when it is around the lower limit.

Warning Do not point the rivet setter at another person while riveting. (The mandrel may be broken and the head may fly out.)

PLX Type / Mandrel head fixed type (Round head)

Fastening the fixed mandrel head will reduce abnormal noise and stop running water.

Symbols of standard dimensions and installation diagram (PAT 5643122)



Product code

D AS 64 PLX
① ② ③ ④

① Flange shape code	(D: Round head)
② Material code	(AS and AC * See the specification table.)
③ Size code	(* See the specification table.)
④ Rivet type	(PLX)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
4.8	5.1 +0.1 0	63	2.0 ~ 4.0	9.6	12.0	9.5	2.6	2.65	2.1	2.5
		64	2.5 ~ 5.0	12.2	14.6					

AC specification table

AC (Sleeve: Aluminum A5154 / fabric, Mandrel: High-tensile stainless steel wire / fabric)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Round head		Tensile	Shear
2.4	2.6 +0.1 0	34	3.7 ~ 6.0	8.9	10.4	4.7	0.8	1.48	0.69	1.0

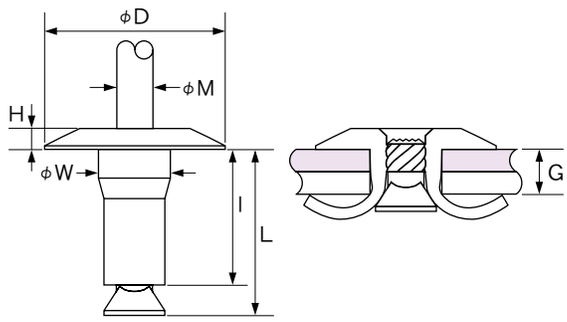
This product is made to order.
*1. The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

Remarks) (1) The mandrel is plated with zinc.
(2) Please ask us when the required fastening range exceeds the recommended range.
(3) Specification of the rivet will be designed based on work material, thickness, and diameter of mating hole. Please inquire us for details.
(4) The standard dimensions are subject to change without notice.

PLX Type / Mandrel head fixed type (Large flange)

Fastening the fixed mandrel head will reduce abnormal noise and stop running water.

Symbols of standard dimensions and installation diagram (PAT 5643122)



(Large flange)

Product code

LF AS 64 PLX
① ② ③ ④

① Flange shape code (LF: Large flange)
② Material code (AS and AC * See the specification table.)
③ Size code (* See the specification table.)
④ Rivet type (PLX)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Large flange		Tensile	Shear
4.8	5.1 +0.1 0	64	2.5 ~ 5.0	12.7	14.4	12	2.6	2.65	2.1	2.5

AC specification table

AC (Sleeve: Aluminum A5154 / fabric, Mandrel: High-tensile stainless steel wire / fabric)

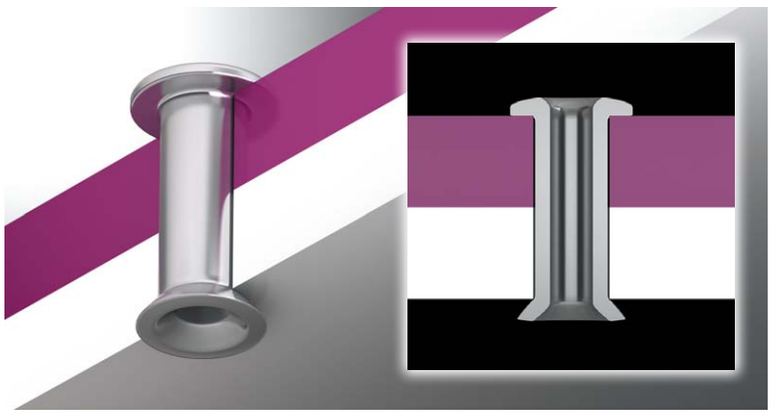
Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code	Recommended fastening range G(mm)	*l* (mm)	L*1 (mm)	D (mm)	H (mm)	M (mm)	Strength*2 (kN)	
							Large flange		Tensile	Shear
4	4.2 +0.1 0	53	3.5 ~ 4.3	8.9	10.8	11	1.5	2.23	1.5	1.5
		56	6.1 ~ 9.3	13.7	15.6	16	2			

This product is made to order.
*1. The L lengths are given as guidelines. *2. The strength values are obtained through our own testing.

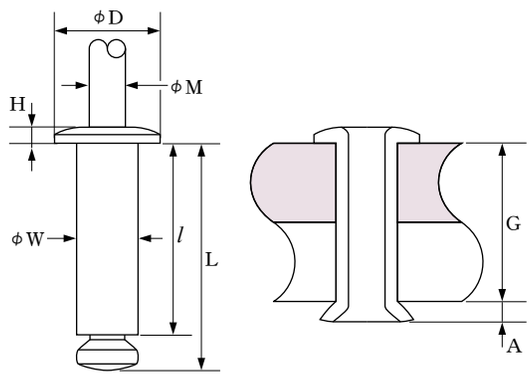
Remarks) (1) The mandrel is plated with zinc.
(2) Please ask us when the required fastening range exceeds the recommended range.
(3) Specification of the rivet will be designed based on work material, thickness, and diameter of mating hole. Please inquire us for details.
(4) The standard dimensions are subject to change without notice.

HL Type / Lower buckling (Round head)

By maintaining the height of the buckling side low, different design variations are available.



Symbols of standard dimensions and installation diagram



Product code

D AS 5G100 HL
① ② ③ ④

① Flange shape code	(D: Round head)
② Material code	(AS * See the specification table.)
③ Size code	(* See the specification table.)
④ Rivet type	(HL)

AS specification table

AS (Sleeve: Aluminum A5154 / fabric, Mandrel: Hard steel wire / zinc plating)

Sleeve diameter W(mm)	Mating hole diameter (mm)	Size code *1	Recommended fastening range G(mm)*1	*l**1 (mm)	L*1 (mm)	A*2 (mm)	D (mm)	H (mm) 丸頭	M (mm)	Strength*1 (kN) Tensile	Strength*1 (kN) Shear
3.2	3.3 +0.1 0	4G***	***	***	***	1.3	6.4	1	1.83	***	***
4.0	4.1 +0.1 0	5G***	***	***	***	1.5	6.7	1.0	2.28	***	***

This product is made to order.
*1. Size code, recommended fastening range, *l*, L and strength vary depending on the use conditions. *2. The A lengths are given as guidelines.

Remarks) (1) The mandrel is plated with zinc.
(2) The standard dimensions are subject to change without notice.
(3) Specification of the rivet will be designed based on work material, thickness, and diameter of mating hole. Please inquire us for details.

Warning Do not point the rivet setter at another person while riveting. (The mandrel may be broken and the head may fly out.)

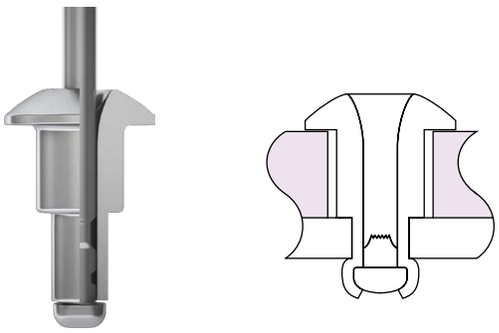
Examples of Customized Rivets

In addition to the standard products, we tailor rivets to specific customer needs. Please don't hesitate to ask us.

Stepped rivet

Features : The height from the seating surface of a workpiece to the flange of a fastened rivet is constant, which serves as a fulcrum pin or a spring catch.

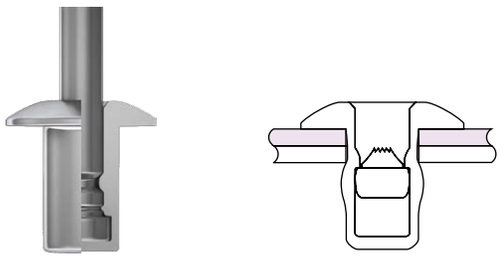
Uses : Glass louvers, bars and handles



Sealed type

Features : The sleeve is bag-shaped and great in air tightens.

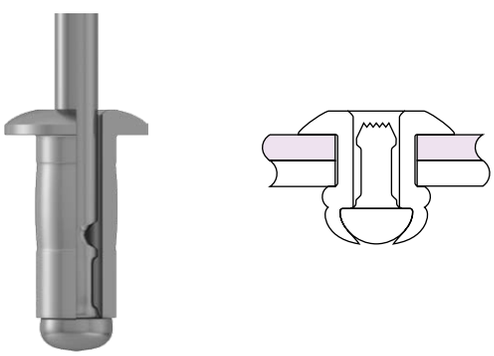
Uses : Shield plugs, outdoor devices and covers



Improved-shear-strength type

Features : The mandrel is brought up to near the head height to enhance the shear strength.

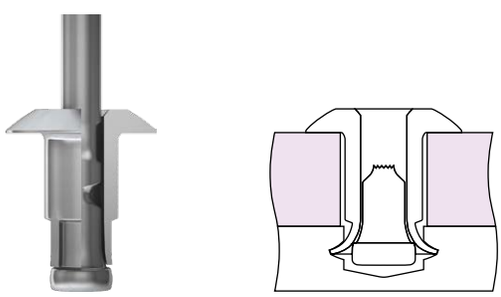
Uses : Reinforcing plates



Blind hole fitting type

Features : This rivet can be fastened into a blind hole in the materials.

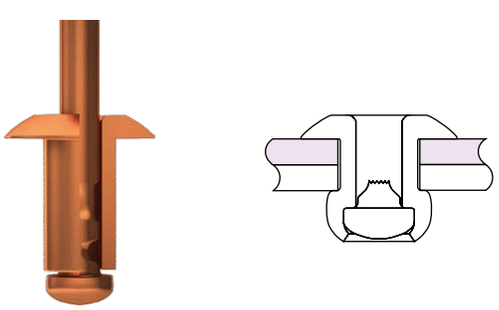
Uses : Building outer and inner walls, cement, and wood



Conductive rivet

Features : The sleeve and mandrel are made of copper alloy.

Uses : Terminal blocks, contacts and connectors



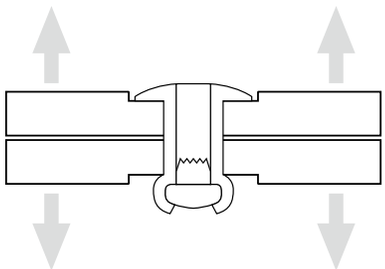
Strength Test Methods and Galvanic Corrosion

Tensile/shear strength test methods

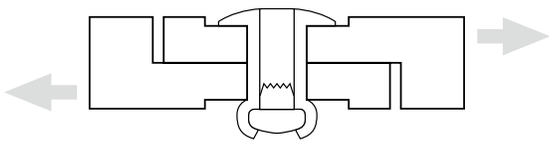
(for blind rivet)

Test conditions
[Test specimen]
- Material : Heat-treated steel plate
- Thickness: 80-100% of recommended fastening range
- Work hole diameter: Recommended work hole diameter

[Testing machine]
- Testing machine: Compliant with the JIS B 7721
- Test speed: 15 mm/min



[Tensile strength test]



[Shear strength test]

1. The methods for strength test, tensile strength test, shear test comply with JIS B 1087.
2. The strength values given in the brochure are measurement results obtained by our testing. They may vary with the type or thickness of materials used. In designing, be sure to allow a safety factor of at least three.

Galvanic corrosion (dissimilar metal corrosion)

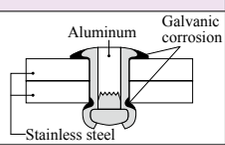
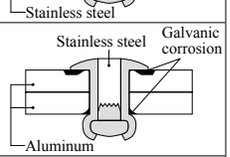
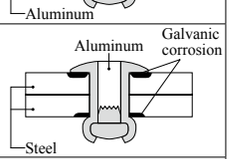
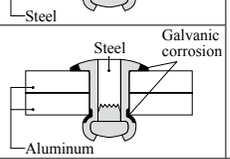
When different metals are in contact with each other, if moisture is present, a potential difference between the metals will cause partial electrification and cause corrosion. This is called galvanic corrosion. Even when the base material and the rivet fastened to it are both resistant to corrosion, when they come into contact with each other, galvanic corrosion may occur. The areas of the base material and the rivet may affect the progression of corrosion.

Base material and rivet for fastening

Conditions triggering galvanic corrosion	Corrosion prevention measures
The potential difference is large.	• Use materials with a smaller potential difference. • Reduce the potential difference, e.g., by plating.
Metals are in contact with moisture.	• Protect with a plastic or other insulators. • Insulate by painting.
The atmosphere is hot and humid.	• Protect with a plastic or other insulators. • Insulate by painting.
The material of the rivet is low-potential metal (base metal).	• Make sure that the material of the rivet has a higher potential (noble) than the base material.

Galvanic series in sea water

Potential	Metal	
-1.50	Magnesium	Base metal (corrosion side)
-1.03	Zinc	
-0.74	Aluminum (5000 series)	
-0.61	Carbon steel	
-0.45	Solder (50/50)	
-0.42	Tin	
-0.36	Brass	
-0.36	Copper	
-0.22	SUS430 (passive)	
-0.20	Nickel	
-0.15	SUS410	
-0.15	Titanium (industrial)	
-0.13	Silver	
-0.10	Titanium (high purity)	
-0.08	SUS304	
-0.05	SUS316	
0.26	Platinum	Noble metal (corrosion-proof side)

Fastening conditions (combination)		Galvanic corrosion example		Progression of corrosion	Fastening reliability
Rivet material	Workpiece material				
Aluminum	Stainless steel	Corrosion of the rivet (the area in contact with the base material) advances very fast.Example under extremely severe condition		Fast	×
Stainless steel	Aluminum	Corrosion of the base material (the area in contact with the rivet) advances. When the base material has a large area of corrosions, the progression of corrosion is relatively slow and the materials can be used depending on usage environment (please ask us).			△
Aluminum	Steel (zinc plating)	Corrosion of the zinc coat of the base material (the area in contact with the rivet) advances first and then corrosion of the rivet begins to advance. The progression of corrosion is slow and the materials can be used depending on usage environment (please ask us).			△
Steel (zinc plating)	Aluminum	Corrosion of the zinc coat of the rivet (the area in contact with the base material) advances first and then corrosion of the base material begins to advance. The progression of corrosion is very slow and the materials can be used depending on usage environment (please ask us).		Slow	○

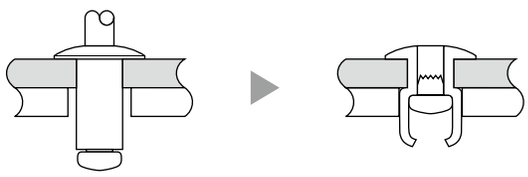
Design Guidelines for blind rivet

Mating hole of workpiece

Recommended diameter of the mating hole: rivet's nominal diameter +0.1mm
*Please refer to the specification table. If the diameter of the mating hole is larger than the recommended size, it may result in fastening failure or insufficient fastening strength.

1. In the case where the hole diameter of buckling side is larger than the recommended size:

Example of improper fastening



If the hole diameter of buckling side is larger than the recommended hole diameter...

The mandrel head may penetrate into the workpiece, resulting in insufficient fastening strength or breakage of the workpiece.

Example of proper fastening

Countermeasure 1

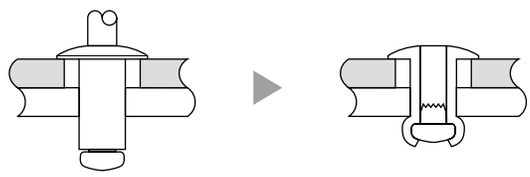
Match the hole diameter to the recommended size.

Countermeasure 2

Insert a metal washer with a hole diameter equivalent to the recommended size.

2. In the case where the hole diameter of flange side is larger than the recommended size:

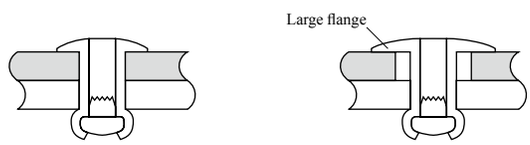
Example of improper fastening



If the hole diameter of flange side is larger than the recommended hole diameter...

The workpieces cannot be held firmly, resulting in insufficient fastening strength.

Example of proper fastening



Countermeasure 1

Match the hole diameter to the recommended size.

Countermeasure 2

Change the flange to a large flange to improve the retention of the workpieces.

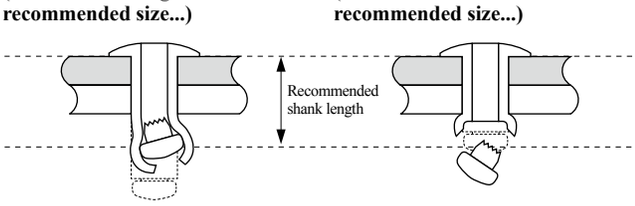
Shank length

Please use the rivet of the recommended size for the thickness of the workpiece. Fastening with a rivet of improper size may result in fastening failure or insufficient fastening strength.

Example of improper fastening

(If the rivet is longer than the recommended size...)

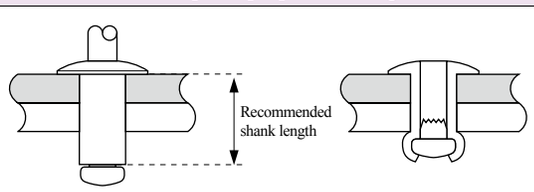
(If the rivet is shorter than the recommended size...)



Buckling or fastening failure may occur.

The mandrel head may fall off, or the fastening strength may become insufficient.

Example of proper fastening

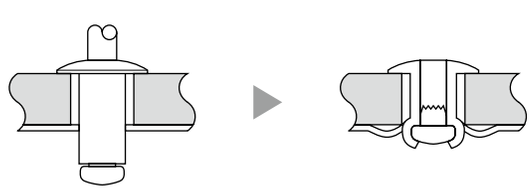


Selecting rivets with the proper size for the workpiece thickness will stabilize fastening quality.

Fastening of thin and thick workpieces (metal-to-metal)

When fastening thin and thick metal workpieces, it is recommended that the side of thick metal workpiece, which has higher strength, be the buckling side.

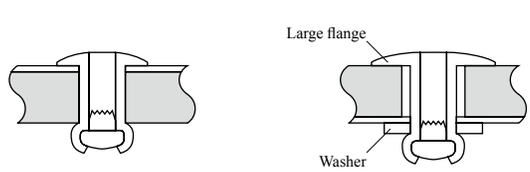
Example of improper fastening



If the hole diameter of the thick workpiece is larger than that of the thin workpiece...

The mandrel may penetrate into the hole and deform the thin workpiece, resulting in fastening failure.

Example of proper fastening



Countermeasure 1

Match the hole diameter to the recommended size and set the thick workpiece with higher strength to be the buckling side.

Countermeasure 2

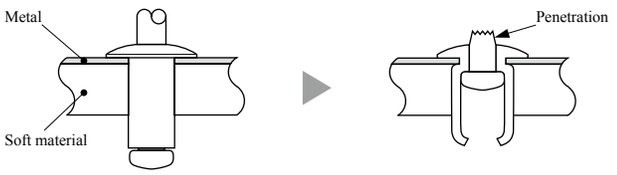
Change the flange to a large flange and insert a metal washer with a hole diameter equivalent to the recommended size.

Fastening of Soft Material Workpiece

When fastening a soft material workpiece (e.g. plastic, plywood, rubber) and a metal workpiece, the retention and fastening strength of the workpieces may decrease due to penetration of the mandrel head into the workpiece, or deformation or damage of soft materials. Preliminary fastening test is highly recommended.
*For soft material workpieces, the larger the diameter of the mating hole, the more likely it is that fastening failure will occur.

1. In the case where a soft material workpiece is on the buckling side:

Example of improper fastening



If the soft material workpiece is on the buckling side...

The mandrel head may penetrate deep into the workpiece, resulting in insufficient fastening strength, or the broken mandrel may penetrate through the flange.

Example of proper fastening

Countermeasure 1

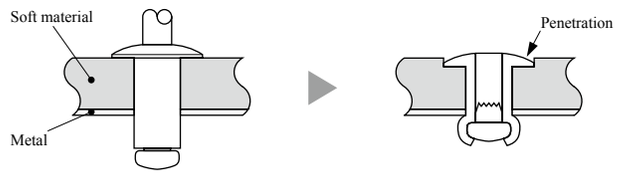
Insert a metal washer on the buckling side.

Countermeasure 2

Use PLX (PL) Type.
*Preliminary fastening test is required.

2. In the case where a soft material workpiece is on the flange side:

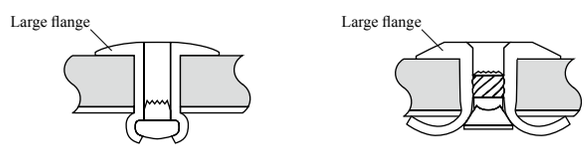
Example of improper fastening



If the soft material workpiece is fastened with a Standard Type rivet...

The flange may penetrate deep into the soft material workpiece, resulting in deformation or breakage of the workpiece.

Example of proper fastening



Countermeasure 1

Change the flange to a large flange to distribute the pressure.

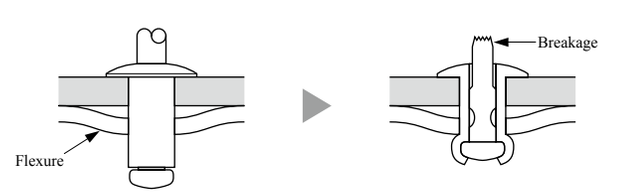
Countermeasure 2

Combine the large flange and PLX Type to improve the retention of the workpieces.

Fastening of workpiece with flexure

If trying to fasten a workpiece with flexure, the elasticity of the workpiece may cause the mandrel to break in the middle or result in incomplete fastening.

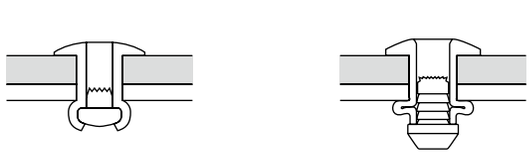
Example of improper fastening



If trying to fasten a workpiece with flexure...

The elastic force of the workpiece is transmitted to the mandrel, and the mandrel may break off in the middle of the shank or break during fastening.

Example of proper fastening



Countermeasure 1

Prepare workpieces with no flexure

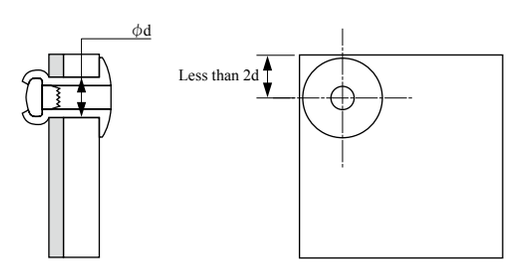
Countermeasure 2

Use FX or GT Type with high fastening force (pulling force)
*Preliminary fastening test is required.

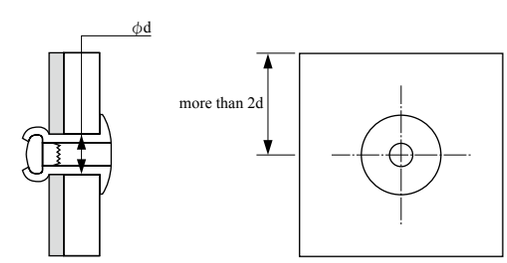
Fastening on the corner or the edge

To ensure stable fastening strength, the distance from the edge of the workpiece to the center of the rivet should be at least twice the nominal diamter (d) of the rivet.
*If the distance is less than twice, the fastening condition may become unstable.

Example of improper fastening



Example of proper fastening



SEMI-TUBULAR RIVET

Secure and uniform fastening is user friendly.

Structure of semi-tubular rivet

Features

Easy fastening

A semi-tubular rivet can be easily and quickly fastened using a rivet setter without any special skills.

Rivet design tailored to specific purpose

Semi-tubular rivets can be made of various materials. They can be tailored to various requirements, such as conductivity and decorative design.

Stable and reliable fastening

A semi-tubular rivet does not loosen easily and that provides reliable fastening. The rivet installation can be checked visually.

Improvement in working efficiency

Using the rivet instead of the screw, bolt or nut; the assembly efficiency can be drastically improved.

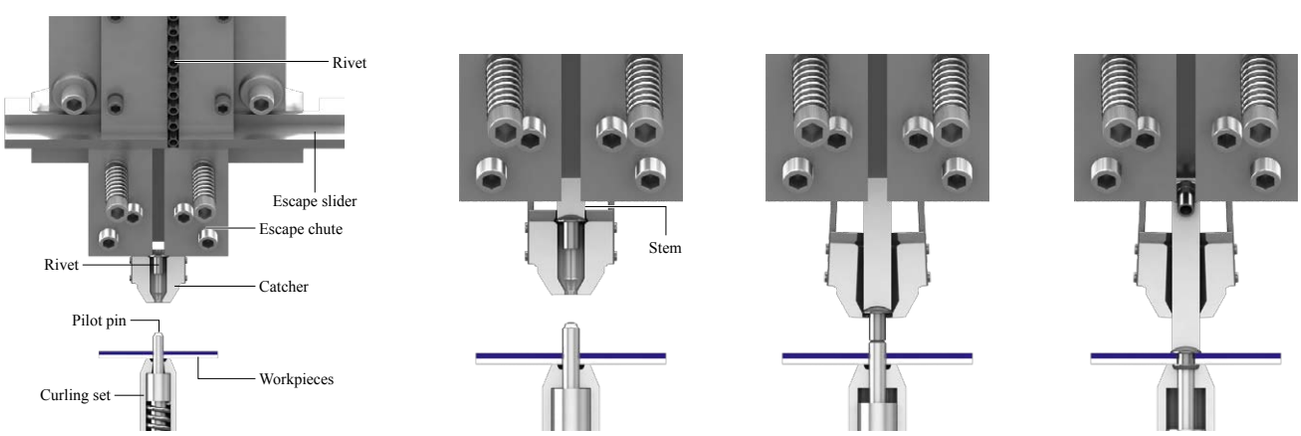
Fastening process

① Insert the pilot pin into the workpieces.

② The stem descends, pressing the rivet head.

③ At the same time, the catcher descends, holding the rivet.

④ Guided by the pilot pin, the rivet goes through the workpieces and fastening is complete.



Operating precautions

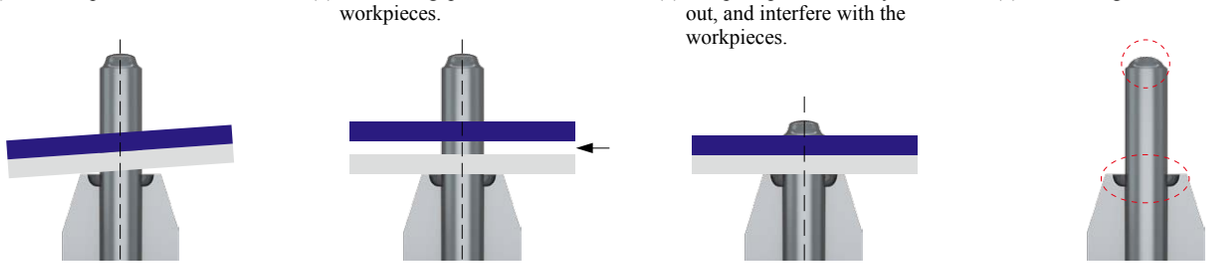
If the rivet is installed in the situations below, it may result in improper fastening.

(1) The workpieces are tilted.

(2) There is a gap between the workpieces.

(3) The pilot pin is not fully out, and interfere with the workpieces.

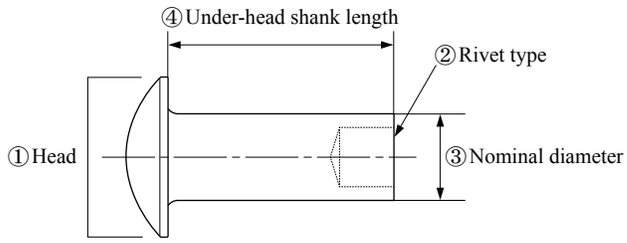
(4) The curling set is worn.



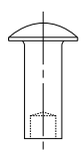
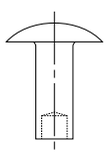
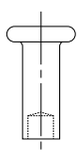
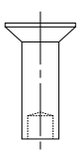
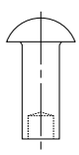
Name

Low round ① Semi-tubular ② 3 ③ × 5 ④

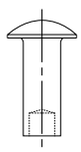
① Type of head (Low round, truss, flat, countersunk and round)
② Rivet type (Semi-tubular)
③ Nominal diameter (See the specification table.)
④ Under-head shank length (See the specification table.)



Types of heads

Low round	Truss	Flat	Countersunk	Round head
				

Rivet type

Semi-tubular


Types of materials and relevant JIS

Materials			Relevant JIS
Description		Code	
Iron	Carbon steel wire	SWCH	JIS G 3507 "Carbon steels for cold heading"
Brass	Brass wire	C2700W	JIS H 3260 "Copper and copper alloy wires"
Copper	Tough pitch copper wire	C1100W	
Aluminum	Aluminum drawn wire	A1070W	JIS H 4040 "Aluminum or aluminum alloy wire"
		A1200W	
	Aluminum alloy drawn wire	A5052W	
		A5056W	
Stainless steel	Stainless steel wire	SUS430-WR	JIS G 4308 "Stainless steel wire"
		SUSXM7-WR	

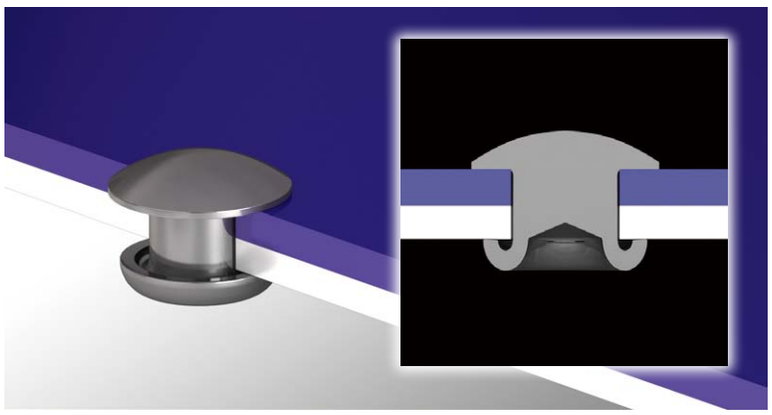
Strength test results by material and shank diameter

Unit (kN)

Nominal diameter			φ1.2	φ1.6	φ2	φ2.5	φ3	φ4	φ5	φ6	φ8
Material	SWCH10A	Tensile	0.29	0.49	0.85	1.23	1.69	3.00	4.69	6.76	12.02
		Shear	0.34	0.61	0.96	1.50	2.17	3.86	6.03	8.68	15.43
	SUS430	Tensile	0.39	0.66	1.14	1.66	2.27	4.03	6.31	9.08	16.15
		Shear	0.45	0.80	1.26	1.97	2.84	5.05	7.89	11.36	20.20
	SUSXM7	Tensile	0.48	0.81	1.39	2.03	2.77	4.93	7.71	11.10	19.74
		Shear	0.51	0.91	1.42	2.23	3.21	5.71	8.93	12.86	22.86
	C2700W	Tensile	0.28	0.47	0.81	1.18	1.62	2.88	4.50	6.48	11.53
		Shear	0.31	0.55	0.86	1.35	1.95	3.47	5.42	7.81	13.89
	C1100W	Tensile	0.17	0.29	0.50	0.73	0.99	1.77	2.77	3.99	7.09
		Shear	0.20	0.37	0.58	0.90	1.30	2.32	3.63	5.23	9.30
	A1070W	Tensile	0.07	0.12	0.20	0.28	0.40	0.71	1.16	1.76	2.85
		Shear	0.10	0.18	0.27	0.44	0.60	1.07	1.61	2.25	4.12
	A1200W	Tensile	0.07	0.13	0.20	0.28	0.40	0.71	1.18	1.79	2.88
		Shear	0.11	0.18	0.31	0.46	0.60	1.13	1.74	2.33	4.26
	A5052W	Tensile	0.13	0.23	0.39	0.54	0.74	1.34	2.18	3.15	5.43
		Shear	0.20	0.35	0.56	0.91	1.18	2.21	3.40	4.56	8.32
	A5056W	Tensile	0.17	0.29	0.47	0.60	0.94	1.46	2.61	3.78	6.73
		Shear	0.23	0.40	0.62	1.00	1.30	2.46	3.80	5.20	9.25

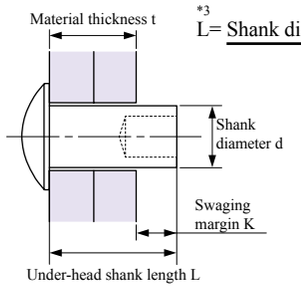
Note) Each of the results above is the measured strength of a rivet alone.

Low, Round Semi-Tubular Rivet



[MOVIE] http://www.byora.co.jp/index/products/movies/semi-tubular.html

Calculation of under-head shank length



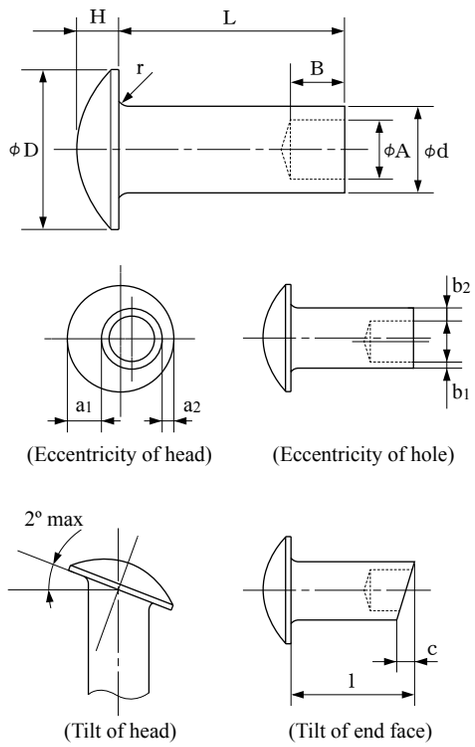
$$L = \frac{\text{Shank diameter(d)} \times \text{Coefficient(0.6)}^{*2}}{*1} + \text{Material thickness(t)}^{*3}$$

*1. Shank diameter (d) x coefficient (0.6) = swaging margin (K)
*2. Use coefficient (0.5) as a guide for SUSXM7 (with hole diameter/depth between 0.75 d and 0.77 d)
*3. The under-head shank length L should be less than 5 times the shank diameter or in the case of stainless steel less than double.

[When a length exceeding the specification is required, please ask us.]

The length obtained by this calculation shall be used as a guide.

Shape and symbols of standard dimensions



Specification table

Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
d	Standard	1.2	1.6	2	2.5	3	4	5	6	8
	Tolerance	+0.02 −0.05			0 −0.08		0 −0.10		0 −0.12	0 −0.15
D	Standard	2.2	3	3.7	4.6	5.4	7.2	9	10.5	13.5
	Tolerance	0 −0.3				0 −0.4		0 −0.5	0 −0.6	
H	Standard	0.3	0.4	0.6	0.9	1.1	1.4	1.8	2.1	2.8
	Tolerance	± 0.05				± 0.1				
A	Standard	0.8	1.1	1.3	1.7	2.1	2.8	3.5	4.2	5.6
	Tolerance	± 0.04		± 0.05		± 0.07		± 0.10		
B	Standard	1.1	1.4	1.8	2.3*4	2.7*4	3.6*4	4.5*4	5.4	7.2
	Tolerance	± 0.1		± 0.15		± 0.2		± 0.25	± 0.3	
r	Max	0.06	0.08	0.1	0.2		0.3		0.4	
a1-a2	Max	0.1	0.2					0.3		0.4
b1-b2	Max	0.1			0.15			0.2		
c	Max	0.2			0.3		0.4			0.5
L	Min	2	2.5	3	3	3.5	4.5	6	8	10
	Max	10	14	14	20	22	28	36	42	56
Recommended work hole diameter	Standard	1.25	1.65	2.1	2.65	3.15	4.2	5.3	6.4	8.5
	Tolerance	+0.05 0				± 0.05				± 0.10

*4. When length L is close to the minimum or maximum, length B shall be 0.8 x d. For details, see the length B list below.

Tolerance of length L

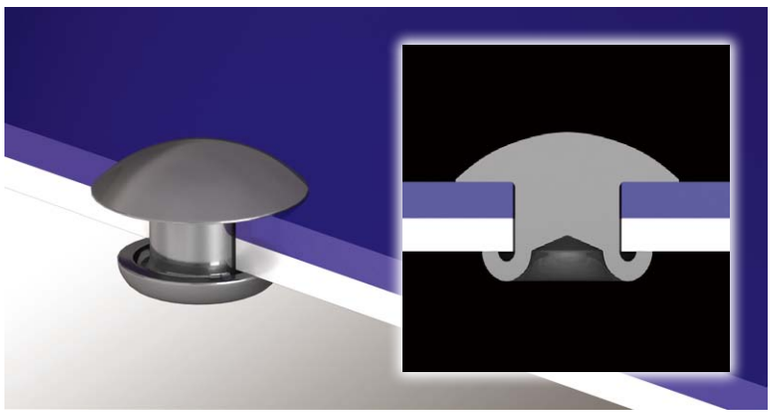
Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
Length L	4 or below	± 0.1			± 0.15		—			
	Over 4 to 10	± 0.15			± 0.2		± 0.25			
	Over 10 to 20	± 0.2			± 0.25		± 0.3			
	Over 20 to 40	—			± 0.3		± 0.4			
	Over 40	—			—		± 0.5			

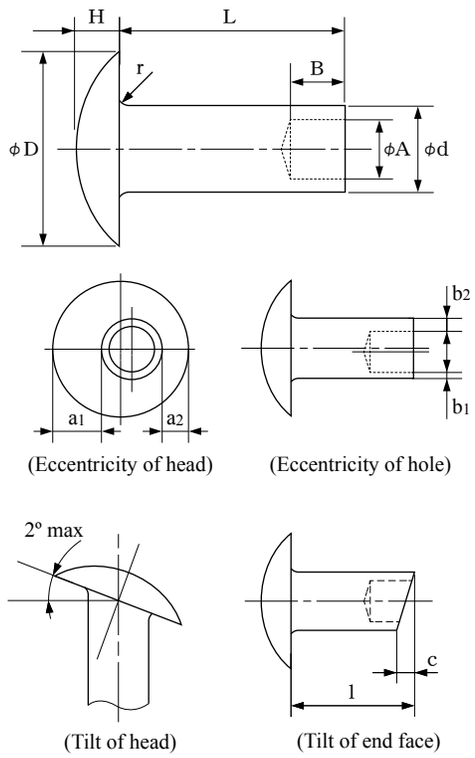
Length B list

Nominal diameter	2.5		3	4			5
Length L	3	3.5	3.5	4.5	5	5.5	6
Length B	2.0		2.4	3.2			4.0

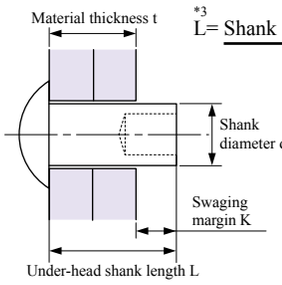
Truss Semi-Tubular Rivet



Shape and symbols of standard dimensions



Calculation of under-head shank length



$$L = \frac{\text{Shank diameter}(d) \times \overset{*2}{\text{Coefficient}(0.6)}}{*1} + \text{Material thickness}(t) \quad {}^{*3}$$

*1. Shank diameter (d) x 0.6 = swaging margin (K)
*2. Use coefficient (0.5) as a guide for SUSXM7 (with hole diameter/depth between 0.75 d and 0.77 d)
*3. The under-head shank length L should be less than 5 times the shank diameter or in the case of stainless steel less than double.

[When a length exceeding the specification is required, please ask us.]

The length obtained by this calculation shall be used as a guide.

Specification table

Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
d	Standard	1.2	1.6	2	2.5	3	4	5	6	8
	Tolerance	+ 0.02 − 0.05			0 −0.08		0 − 0.10		0 − 0.12	0 − 0.15
D	Standard	2.7	3.6	4.5	5.6	6.6	8.8	11	13	17
	Tolerance	0 − 0.3				0 − 0.4		0 − 0.5	0 − 0.6	
H	Standard	0.5	0.7	1	1.3	1.4	1.8	2.4	2.8	3.8
	Tolerance	± 0.05				± 0.1				
A	Standard	0.8	1.1	1.3	1.7	2.1	2.8	3.5	4.2	5.6
	Tolerance	± 0.04		± 0.05		± 0.07		± 0.10		
B	Standard	1.1	1.4	1.8	2.3 *4	2.7 *4	3.6 *4	4.5 *4	5.4	7.2
	Tolerance	± 0.1		± 0.15		± 0.2		± 0.25	± 0.3	
r	Max	0.1	0.15	0.15	0.2	0.3		0.4	0.5	0.6
a1-a2	Max	0.1	0.2					0.3		0.4
b1-b2	Max	0.1			0.15			0.2		
c	Max	0.2			0.3		0.4			0.5
L	Min	2	2.5	3	3	3.5	4.5	6	8	10
	Max	10	14	14	20	22	28	36	42	56
Recommended work hole diameter	Standard	1.25	1.65	2.1	2.65	3.15	4.2	5.3	6.4	8.5
	Tolerance	+ 0.05 0				± 0.05				± 0.10

*4. When length L is close to the minimum or maximum, length B shall be 0.8 x d. For details, see the length B list below.

Tolerance of length L

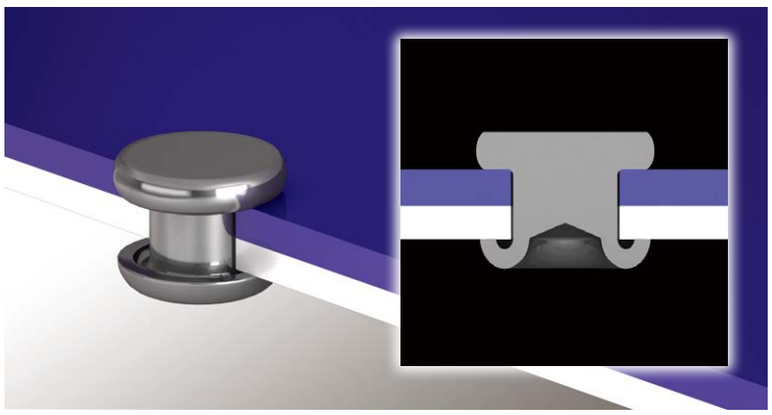
Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
Length L	4 or below	± 0.1			± 0.15		—			
	Over 4 to 10	± 0.15			± 0.2		± 0.25			
	Over 10 to 20	± 0.2			± 0.25		± 0.3			
	Over 20 to 40	—			± 0.3		± 0.4			
	Over 40	—			—		± 0.5			

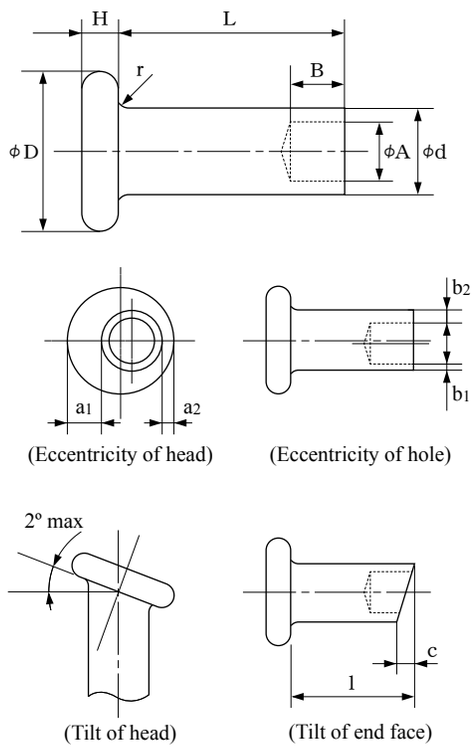
Length B list

Nominal diameter	2.5		3	4			5
Length L	3	3.5	3.5	4.5	5	5.5	6
Length B	2.0		2.4	3.2			4.0

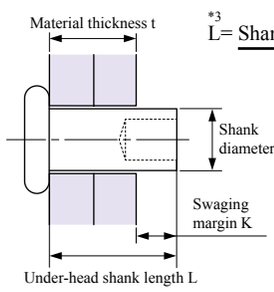
Flat Semi-Tubular Rivet



Shape and symbols of standard dimensions



Calculation of under-head shank length



$$L = \frac{\text{Shank diameter}(d) \times \text{Coefficient}(0.6)^{*2}}{*1} + \text{Material thickness}(t)^{*3}$$

*1. Shank diameter (d) x 0.6 = swaging margin (K)
*2. Use coefficient (0.5) as a guide for SUSXM7 (with hole diameter/depth between 0.75 d and 0.77 d)
*3. The under-head shank length L should be less than 5 times the shank diameter or in the case of stainless steel less than double.

[When a length exceeding the specification is required, please ask us.]

The length obtained by this calculation shall be used as a guide.

Specification table

Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
d	Standard	1.2	1.6	2	2.5	3	4	5	6	8
	Tolerance	+ 0.02 − 0.05			0 − 0.08		0 − 0.10		0 − 0.12	0 − 0.15
D	Standard	2.2	3	3.7	4.6	5.4	7.2	9	10.5	13.5
	Tolerance	0 − 0.3				0 − 0.4		0 − 0.5	0 − 0.6	
H	Standard	0.3	0.4	0.6	0.9	1.1	1.4	1.8	2.1	2.8
	Tolerance	± 0.05				± 0.1				
A	Standard	0.8	1.1	1.3	1.7	2.1	2.8	3.5	4.2	5.6
	Tolerance	± 0.04		± 0.05		± 0.07		± 0.10		
B	Standard	1.1	1.4	1.8	2.3*4	2.7*4	3.6*4	4.5*4	5.4	7.2
	Tolerance	± 0.1		± 0.15		± 0.2		± 0.25	± 0.3	
r	Max	0.06	0.08	0.1	0.2		0.3		0.4	
a1-a2	Max	0.1	0.2					0.3		0.4
b1-b2	Max	0.1			0.15			0.2		
c	Max	0.2			0.3		0.4			0.5
L	Min	2	2.5	3	3	3.5	4.5	6	8	10
	Max	10	14	14	20	22	28	36	42	56
Recommended work hole diameter	Standard	1.25	1.65	2.1	2.65	3.15	4.2	5.3	6.4	8.5
	Tolerance	+ 0.05 0				± 0.05				± 0.10

*4. When length L is close to the minimum or maximum, length B shall be 0.8 x d. For details, see the length B list below.

Tolerance of length L

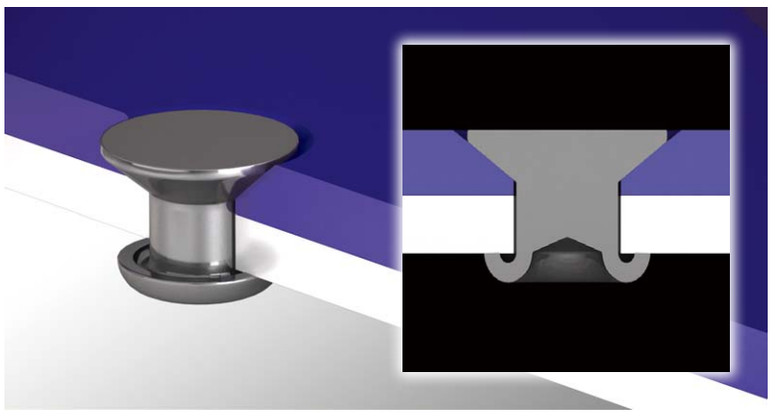
Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
Length L	4 or below	± 0.1			± 0.15		—			
	Over 4 to 10	± 0.15			± 0.2		± 0.25			
	Over 10 to 20	± 0.2			± 0.25		± 0.3			
	Over 20 to 40	—			± 0.3		± 0.4			
	Over 40	—			—		± 0.5			

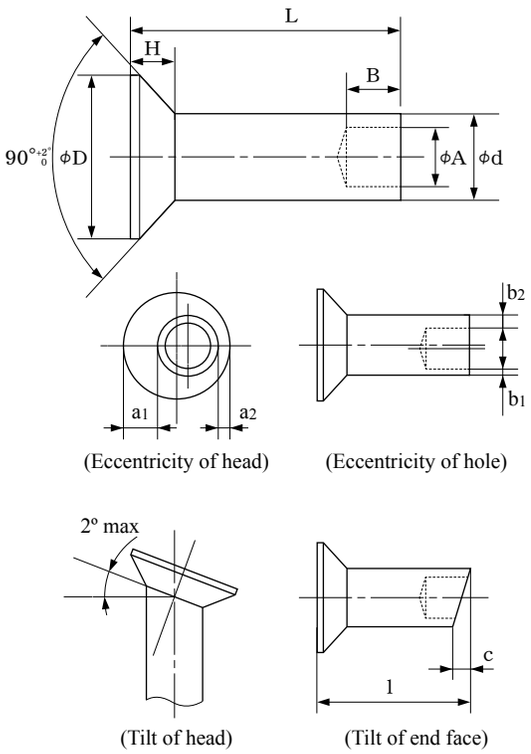
Length B list

Nominal diameter	2.5		3	4			5
Length L	3	3.5	3.5	4.5	5	5.5	6
Length B	2.0		2.4	3.2			4.0

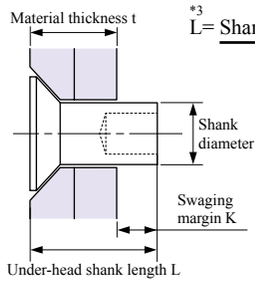
Countersunk, Semi-Tubular Rivet



Shape and symbols of standard dimensions



Calculation of under-head shank length



$$L = \frac{\text{Shank diameter}(d) \times \overset{*2}{\text{Coefficient}}(0.6)}{*1} + \text{Material thickness}(t)$$ *3

*1. Shank diameter (d) x 0.6 = swaging margin (K)
*2. Use coefficient (0.5) as a guide for SUSXM7 (with hole diameter/depth between 0.75 d and 0.77 d)
*3. The under-head shank length L should be less than 5 times the shank diameter or in the case of stainless steel less than double.

When a length exceeding the specification is required, please ask us.

The length obtained by this calculation shall be used as a guide.

Specification table

Unit (mm)

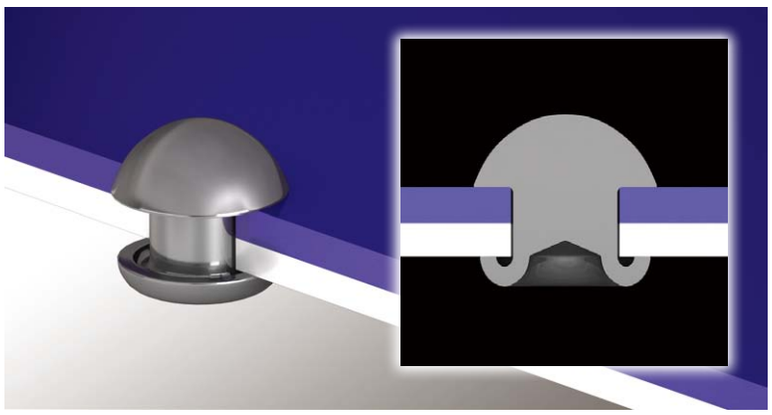
Nominal diameter		2	2.5	3	4	5	6	8
d	Standard	2	2.5	3	4	5	6	8
	Tolerance	+ 0.02 − 0.05	0 − 0.08		0 − 0.10		0 − 0.12	0 − 0.15
D	Standard	4	5	6	8	10	12	16
	Tolerance	0 − 0.4		0 − 0.5		0 − 0.6	0 − 0.7	
H	Approx.	1	1.3	1.5	2	2.5	3	4
A	Standard	1.3	1.7	2.1	2.8	3.5	4.2	5.6
	Tolerance	± 0.05		± 0.07		± 0.10		
B	Standard	1.8	2.3	2.7	3.6	4.5	5.4	7.2
	Tolerance	± 0.15		± 0.2		± 0.25	± 0.3	
a1-a2	Max	0.2				0.3		0.4
b1-b2	Max	0.1	0.15			0.2		
c	Max	0.2	0.3		0.4			0.5
L	Min	4	5	6	8	10	12	16
	Max	14	20	22	28	36	42	56
Recommended work hole diameter	Standard	2.1	2.65	3.15	4.2	5.3	6.4	8.5
	Tolerance	+ 0.05 0	± 0.05					± 0.10

Tolerance of length L

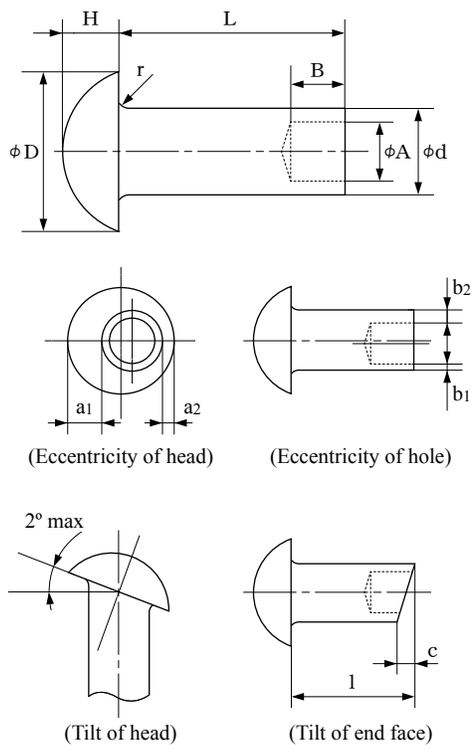
Unit (mm)

Nominal diameter		2	2.5	3	4	5	6	8
Length L	4 or below	± 0.1	± 0.15		—			
	Over 4 to 10	± 0.15	± 0.2		± 0.25			
	Over 10 to 20	± 0.2	± 0.25		± 0.3			
	Over 20 to 40	—	± 0.3		± 0.4			
	Over 40	—	—		± 0.5			

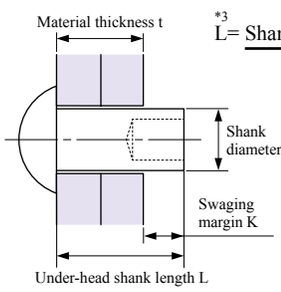
Round, Semi-Tubular Rivet



Shape and symbols of standard dimensions



Calculation of under-head shank length



$$L = \frac{\text{Shank diameter}(d) \times \overset{*2}{\text{Coefficient}(0.6)}}{*1} + \text{Material thickness}(t)$$

*1. Shank diameter (d) x 0.6 = swaging margin (K)
*2. Use coefficient (0.5) as a guide for SUSXM7 (with hole diameter/depth between 0.75 d and 0.77 d)
*3. The under-head shank length L should be less than 5 times the shank diameter or in the case of stainless steel less than double.

[When a length exceeding the specification is required, please ask us.]

The length obtained by this calculation shall be used as a guide.

Specification table

Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
d	Standard	1.2	1.6	2	2.5	3	4	5	6	8
	Tolerance	+ 0.02 − 0.05			0 − 0.08		0 − 0.10		0 − 0.12	0 − 0.15
D	Standard	2.2	3	3.7	4.6	5.4	7.2	9	10.5	13.5
	Tolerance	0 − 0.3				0 − 0.4		0 − 0.5	0 − 0.6	
H	Standard	0.7	1	1.2	1.5	1.8	2.4	3	3.6	4.8
	Tolerance	± 0.05				± 0.1				
A	Standard	0.8	1.1	1.3	1.7	2.1	2.8	3.5	4.2	5.6
	Tolerance	± 0.04		± 0.05		± 0.07		± 0.10		
B	Standard	1.1	1.4	1.8	2.3 *4	2.7 *4	3.6 *4	4.5 *4	5.4	7.2
	Tolerance	± 0.1		± 0.15		± 0.2		± 0.25	± 0.3	
r	Max	0.06	0.08	0.1	0.2		0.3		0.4	
a1-a2	Max	0.1	0.2					0.3		0.4
b1-b2	Max	0.1			0.15			0.2		
c	Max	0.2			0.3		0.4			0.5
L	Min	2	2.5	3	3	3.5	4.5	6	8	10
	Max	10	14	14	20	22	28	36	42	56
Recommended work hole diameter	Standard	1.25	1.65	2.1	2.65	3.15	4.2	5.3	6.4	8.5
	Tolerance	+ 0.05 0				± 0.05				± 0.10

*4. When length L is close to the minimum or maximum, length B shall be 0.8 x d. For details, see the length B list below.

Tolerance of length L

Unit (mm)

Nominal diameter		1.2	1.6	2	2.5	3	4	5	6	8
Length L	4 or below	± 0.1			± 0.15		—			
	Over 4 to 10	± 0.15			± 0.2		± 0.25			
	Over 10 to 20	± 0.2			± 0.25		± 0.3			
	Over 20 to 40	—			± 0.3		± 0.4			
	Over 40	—			—		± 0.5			

Length B list

Nominal diameter	2.5		3	4			5
Length L	3	3.5	3.5	4.5	5	5.5	6
Length B	2.0		2.4	3.2			4.0

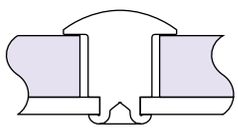
Examples of Customized Rivets

In addition to the standard products, we tailor rivets to specific customer needs. Please don't hesitate to ask us for more information.

Shoulder rivet

Features : The rivet height, after being fastened, is constant. It can be used as a fulcrum pin or a spring catch.

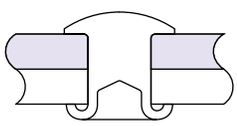
Uses : Glass louvers, bars and handles



Anti-crack rivet

Features : Heat treatment is performed to prevent cracking in curls.

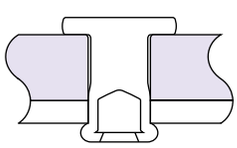
Uses : Baby products and nursing care products



Expansion rivet

Features : The rivet shank is expanded to ensure alignment of the materials. The dual curls fasten the materials firmly. The curls will not crack.

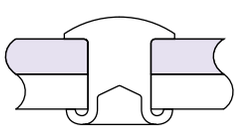
Uses : Hole punches



Corrosion resistant rivet

Features : The rivet is highly resistant to corrosion by seawater or chemicals(sulfuric acid and organic acid).

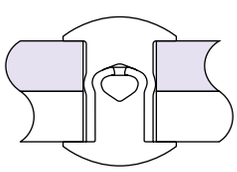
Uses : Marine products and products designed for outdoor use



Double head rivet

Features : Two different types of rivets are combined into a double head rivet.

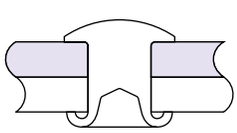
Uses : Wheeled suitcases (handles) and kitchen knife handles



Tapered semi-tubular rivet

Features : The rivet is more resistant to buckling than ordinary rivets. It is suitable for fastening a long semi-tubular rivet.

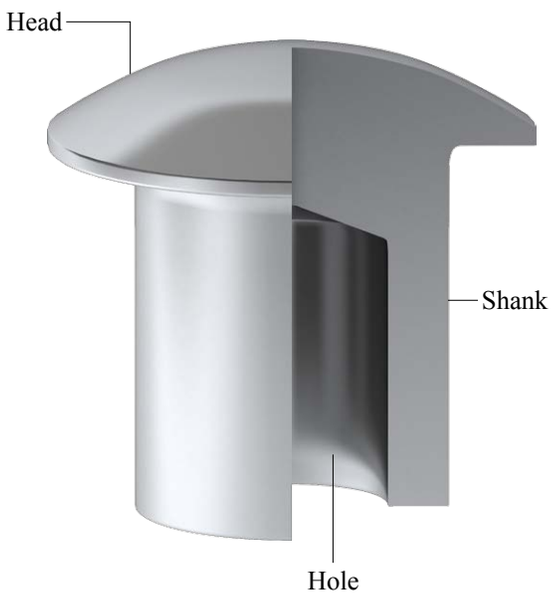
Uses : Automobile-related products and can lever fittings



SELF-PIERCING RIVET

A mating hole in the materials is not required. Dissimilar materials are securely fastened.

Structure of self-piercing rivet



Features

No mating hole required

The self-piercing rivet pierces through the materials while fastening them together. A work hole does not need to be made in advance.

Secure fastening of dissimilar materials

The rivet securely fastens dissimilar materials low in weldability, such as aluminum and iron.

Perfect for fastening color steel plates

The self-piercing rivet fastens materials without heating and repainting.

Environmentally friendly fastening

Fastening with a self-piercing rivet does not cause sparks, smoke, or riveting scrap.It is a clean fastening technique friendly to the working environment.

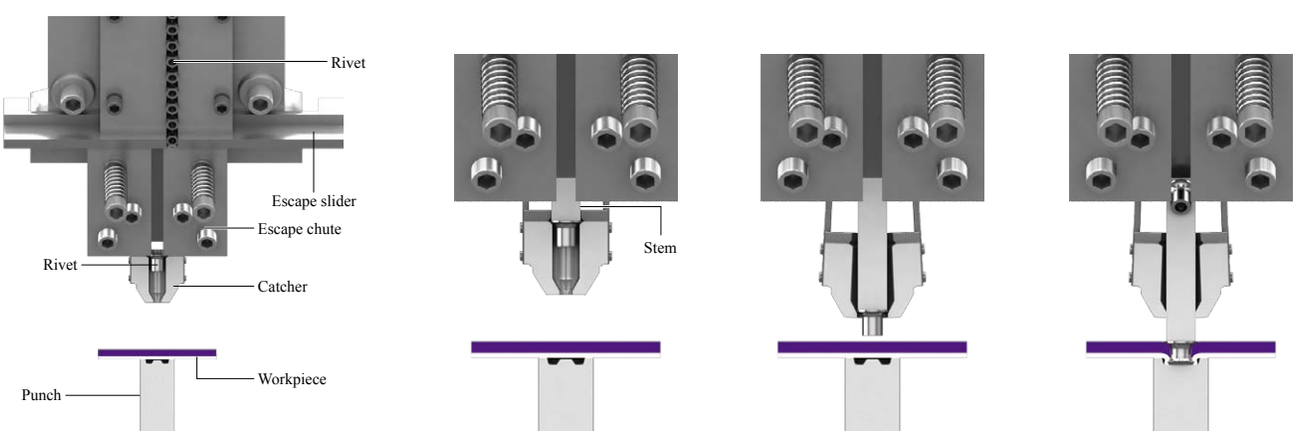
Fastening process

① Place the workpieces on the punch.

② The stem descends, pressing the rivet head.

③ At the same time, the catcher descends, holding the rivet.

④ The rivet pierces through the workpieces and fastening is complete.



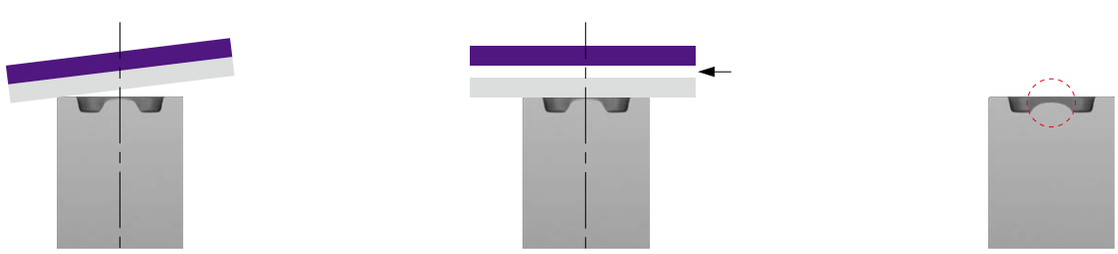
Operating precautions

If the rivet is installed in the situations below, it may result in improper fastening.

(1) The workpieces are tilted.

(2) There is a gap between the workpieces.

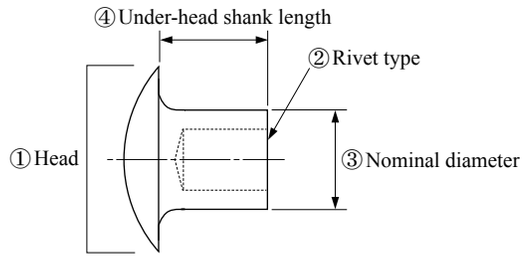
(3) The punch is worn.



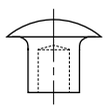
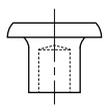
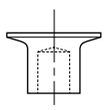
Name

Low round ① Self-piercing ② 3 ③ × 3.5 ④

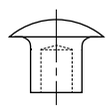
① Type of head (Low round, flat and countersunk)
② Rivet type (Self-piecing)
③ Nominal diameter (See the specification table.)
④ Under-head shank length (See the specification table.)



Types of heads

Low round	Flat	Countersunk
		

Rivet type

Self-piercing


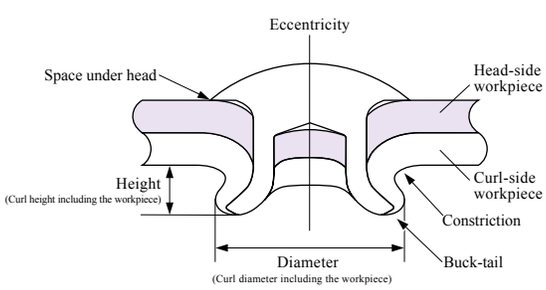
Nominal diameter / Under-head shank length

Unit (mm)

Nominal diameter	2		3		3.6			4				5			
Under-head L	2.0	2.3	3.0	3.5	3.9	4.2	4.5	4.0	4.5	5.0	5.5	5.5	6.0	6.5	7.0
Fastening range	0.3 ~ 0.6	0.4 ~ 0.8	0.4 ~ 1.2	0.9 ~ 1.6	1.0 ~ 1.8	1.6 ~ 2.1	2.1 ~ 2.6	1.2 ~ 1.8	1.8 ~ 2.3	2.3 ~ 2.8	2.8 ~ 3.2	2.0 ~ 2.7	2.7 ~ 3.2	3.2 ~ 3.7	3.7 ~ 4.3

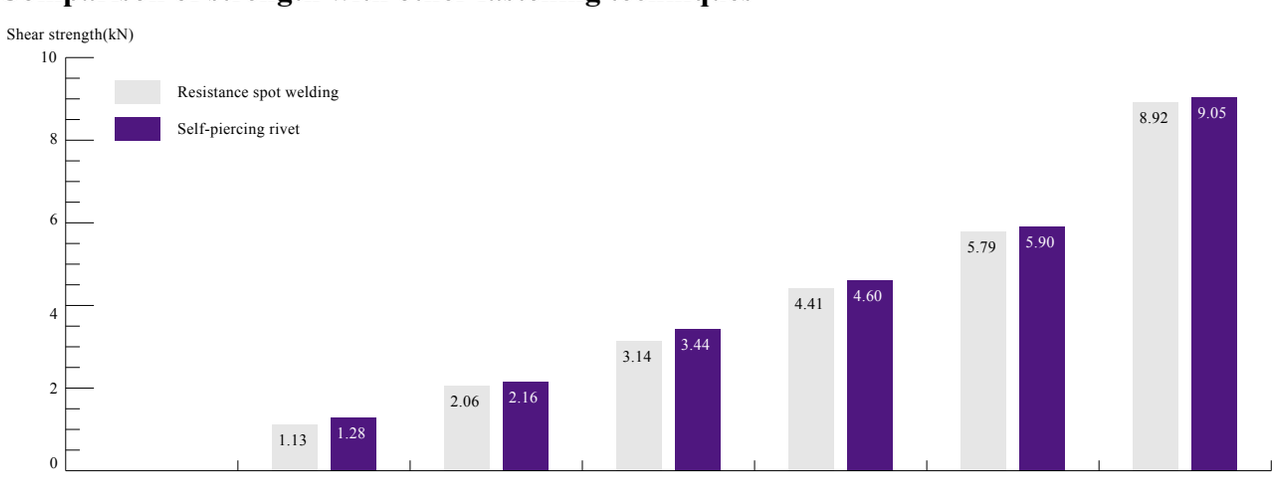
Note) The table is based on assumption that workpieces of SPCC (painted or plated) with hardness of Hv120 or equivalent are fastened.

Rivet installation criteria (Countersunk rivets and sealed self-piercing rivets (see page 22) are excluded.)



External quality	Space under head	There shall be no space between the head and around the workpiece.
	Height	Rivet shank diameter x 0.5 (guide)
	Buck-tail	There shall be no large cracks.
	Constriction	There should be a constriction around full circumference of rivet.
	Eccentricity	The buck-tail shall have an almost uniform shape.
	Diameter	Rivet shank diameter x (1.5 to 1.7) (guide)

Comparison of strength with other fastening techniques

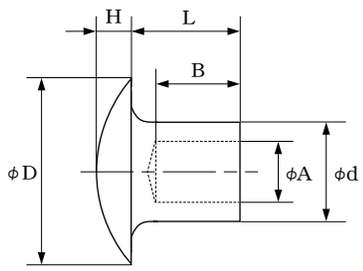


Material thickness (mm)	0.4 (0.8 in total)	0.6 (1.2 in total)	0.8 (1.6 in total)	1.0 (2.0 in total)	1.2 (2.4 in total)	1.6 (3.2 in total)
Rivet dimensions	3 × 3	3.6 × 3.9	4 × 4	5 × 5.5	5 × 5.5	5 × 6.5

Self-Piercing Rivet

[MOVIE] http://www.byora.co.jp/index/products/movies/self-piercing.html

Shape and symbols of standard dimensions



Name

Low round ① Self-piercing ② 3 × 3.5 ③ ④

① Type of head	(Low round, flat and countersunk)
② Rivet type	(Self-piecing)
③ Nominal diameter	(See the specification table.)
④ Under-head shank length	(See the specification table.)

Material

Standard specification : Steel (high-carbon steel)
Special specification : Stainless steel or aluminum
(Please ask us.)

Surface treatment

Zinc plating, nickel plating, chrome plating,
Geomet or head baked finish

Specification table

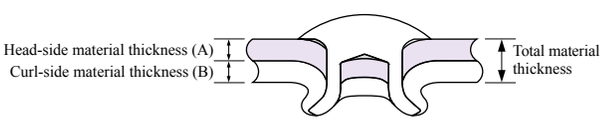
Unit (mm)

Nominal diameter		2		3	3.6		4			5			
d	Standard	2		3	3.6		4			5			
	Tolerance	+ 0.02		± 0.05									
D	Standard	3.7		5.5	6.6		7.4			9.6			
	Tolerance	0 − 0.3		0 − 0.4									
H	Standard	0.6		1.0	1.2		1.5			1.8			
	Tolerance	±0.05											
A		1.2		1.8	2.2		2.4			2.9			
B		1.5		L×0.8									
L		2.0	2.3	3.5	3.9	4.2	4.5	4.5	5.0	5.5	5.5	6.0	6.5	7.0
Recommended total material thickness		0.3 ≀ 0.6	0.4 ≀ 0.8	0.9 ≀ 1.6	1.0 ≀ 1.8	1.6 ≀ 2.1	2.1 ≀ 2.6	1.8 ≀ 2.3	2.3 ≀ 2.8	2.8 ≀ 3.2	1.8 ≀ 2.6	2.6 ≀ 3.3	3.1 ≀ 3.8	3.6 ≀ 4.3

Note) (1) The size of a self-piercing rivet is subject to trial fastening.
(2) Please ask us for the following requirements.
(i) The types of workpieces are different from steel plates for general mechanical structures. (ii) The difference in thickness between the two workpieces is extremely large.
(iii) The total material thickness is outside the recommended fastening range.
(3) Flat head and countersunk rivets are made to order.

Fastening strength measurement test

Fastening conditions

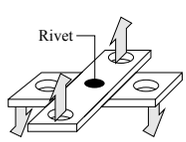


[Test Example] Cold-rolled steel plate, Material thickness: Intermediate value of fastening range
[Rivet] Self-piercing rivet (steel)

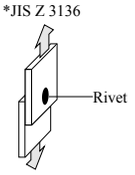
Test method

[Testing machine]
Testing machine : Compliant withthe JIS B 7721
Test speed : 15 mm/min

[Tensile strength test method]
*JIS Z 3137



[Shear strength test method]
*JIS Z 3136



Fastening test conditions (mm)				Strength measurement result (kN)	
Rivet	Head-side material thickness (A)	Curl-side material thickness (B)	Total material thickness (A + B)	Tensile fracture	Shear fracture
2 × 2	0.25	0.25	0.50	0.24	0.58
3 × 3.5	0.60	0.60	1.20	1.18	1.97
3.6 × 4.5	1.20	1.20	2.40	2.97	4.21
4 × 5.5	1.60	1.60	3.20	4.80	6.90
5 × 7	1.60	2.30	3.90	9.10	11.20

Note) The strength values given in the brochure are measurement results obtained by our testing. They may vary with the type or thickness of materials used.
In designing, be sure to allow a safety factor of at least three to one.

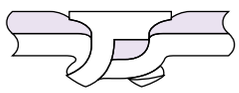
Examples of Customized Rivets

In addition to the standard products, we tailor rivets to specific customer needs. Please don't hesitate to ask us.

Three-legged rivet

Features : Scrap by punching of the workpieces will not to be generated.The workpieces or the rivet won't turn.

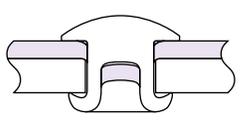
Uses : Noise barriers, automobiles and building structures



Half piercing rivet

Features : By making a hole in the thicker workpiece in advance, positioning is enabled using the hole. The half piercing rivet can fasten thicker workpieces than standard self-piercing rivets.

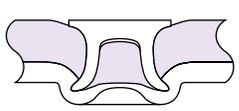
Uses : Scaffolds (plated steel plate / plated steel plate with hole), heavy shutters (color steel plate / plated steel plate)



Low-profile fastening (thin round curl)

Features : The buck-tail has a smooth contour and it does not catch other materials.

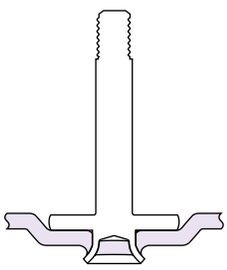
Uses : Shutter rails (sliding part) and signboards



Self-piercing bolt

Features : No welding is required and the fastened joint does not need a touch-up. The work area is kept clean and neat.

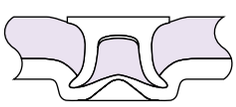
Uses : Motor mounting bolts and nuts



Sealed self-piercing rivet

Features : The rivet shank does not pierce through the workpieces and thus high air-tight sealing is maintained. The appearance is neat.

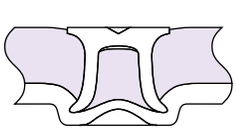
Uses : Storerooms, scaffold planks, shutters, storm doors, containers (plywood / plated steel plate), building components, signboards and other products for outdoor use



Rivet for plywood/plaster

Features : This rivet does not require drilling a hole in the plywood or plaster. No drilling scrap is generated and the work area is kept clean.

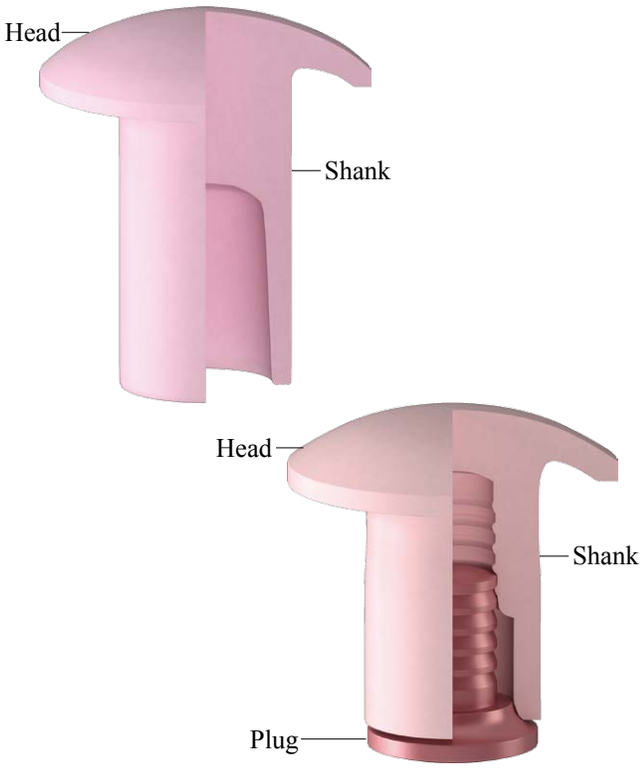
Uses : Containers (plywood / plated steel plate) and building components



PLASTIC RIVET

No heating is required. Plastic rivet with an anti-loosening structure.

Structure of plastic rivet



Features

Fastening at normal temperature without heating

This is a plastic semi-tubular rivet that can be fastened at normal temperature.

“Spring back structure” for anti-loosening

The spring back structures of the head and the buck-tail prevent loosening of a fastened rivet, common to plastic rivets.

Various colors

The rivet is made of polyacetal (POM) and it comes in a wide selection of colors.

Suitable for eco-friendly products

Using this rivet instead of a metal fastener, a manufacturer can develop a product that is environmentally friendly and requires no sorting for waste.

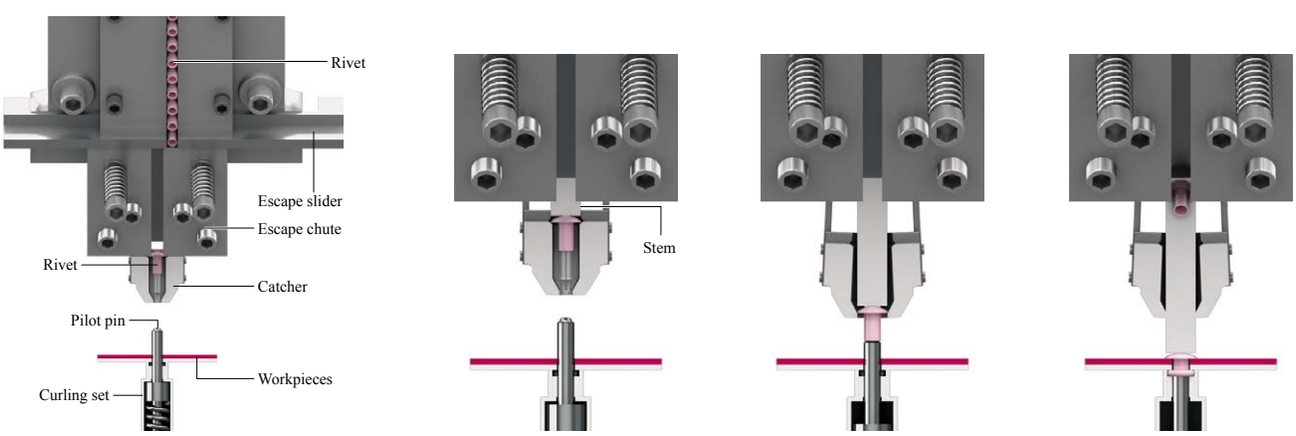
Fastening process

① Insert the pilot pin into the workpieces.

② The stem descends, pressing the rivet head.

③ At the same time, the catcher descends, holding the rivet.

④ Guided by the pilot pin, the rivet goes through the workpieces and fastening is complete.



Operating precautions

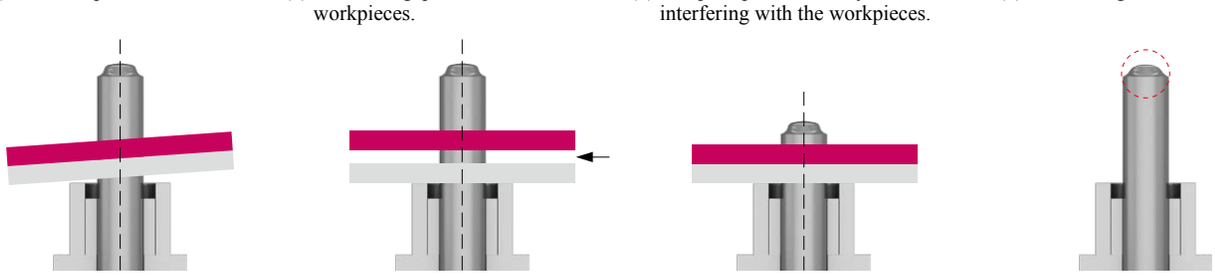
If the rivet is installed in the situations below, it may result in improper fastening.

(1) The workpieces are tilted.

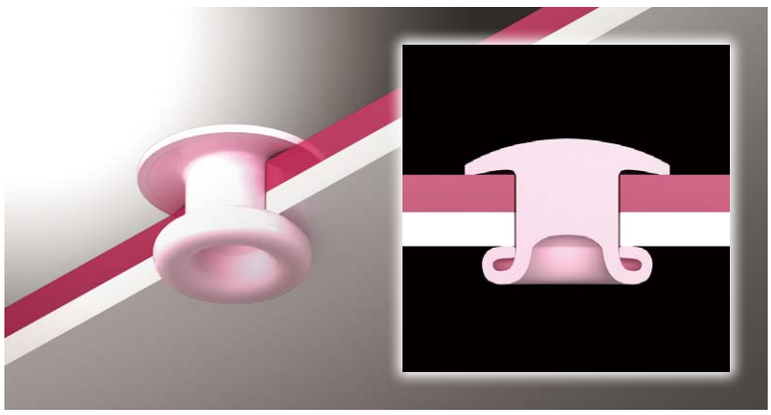
(2) There is a gap between the workpieces.

(3) The pilot pin is not fully out, interfering with the workpieces.

(4) The curling set is worn.

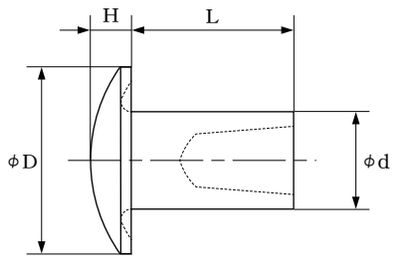


Roll-Up Rivet

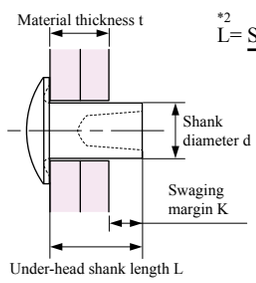


[MOVIE] http://www.byora.co.jp/index/products/movies/rollup.html

Shape and symbols of standard dimensions



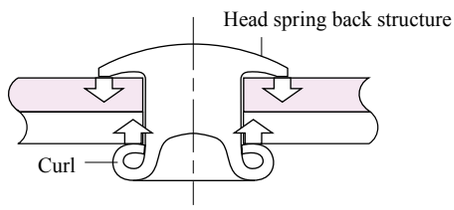
Calculation of under-head shank length



$$L = \frac{\text{Shank diameter}(d) \times \text{Coefficient}(1)}{*1} + \text{Material thickness}(t) \quad *2$$

*1. Shank diameter (d) x 1 = swaging margin (K)
*2. The length obtained by this calculation shall be used as a guide.

Fastening using spring back



The spring back structures of both the head and the curl prevent loosening of a fastened rivet. (PAT 3029862)

Specification table

Unit (mm)

Nominal diameter	d		D		H		L			Recommended work hole diameter		Strength (kN)	
	Standard	Tolerance	Standard	Tolerance	Standard	Tolerance	Min	Max	Tolerance	Standard	Tolerance	Tensile	Shear
3.5	3.5	± 0.1	8.0	± 0.2	1.3	± 0.1	5	15.0	± 0.2	3.7	+ 0.1 0	0.11	0.31
4	4		7.6		1.7		6			4.2		0.16	0.42
4.5	4.5		8.6		1.9		7			4.7		0.20	0.46
5	5		9.6		2.1		7	25.0		5.3		0.26	0.61
6	6		11.5		2.5		8			6.3		0.40	0.90

Remarks) A selection of materials, such as POM, PP and PA, are available to suit various purposes.

Note) The strength may be reduced when the rivet is fastened with a low ambient temperature or when it is used for some purposes. Please ask us. (Testing ambient temperature: 23ºC)

Chemical properties of polyacetal (POM)

(1) Combustibility

	Flash point	Autoignition point	Ignition time	Burning speed	Burning rate	Smoke	CO_2	CO	O_2
POM	320°C	400°C	11 sec	3.5 g/min	98.9%	0.005㎥	0.191Vol%	0.001Vol%	0.258Vol%

Remarks) POM is plastic made up of carbon (C), hydrogen (H) and oxygen (O). The composition ratio stands at C:40%, H:5.7% and O:53.3%.

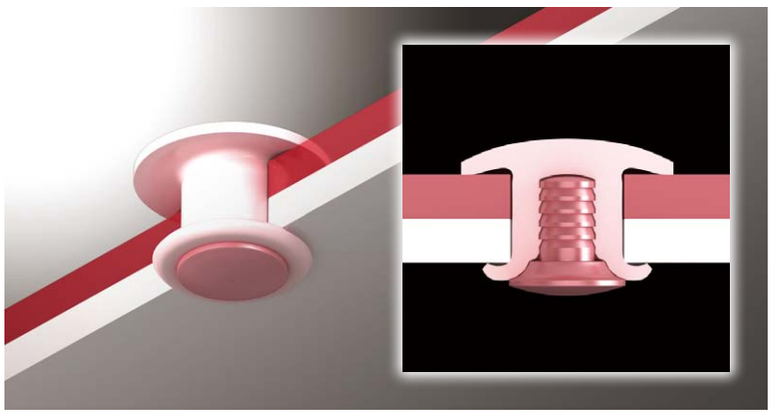
(2) Chemical resistance

Compatibility ◎ : Fully compatible ○ : With reservations, △ : Only at normal temperature with no stress, × : Not compatible

	Methanol	Ethanol	Toluene	Gasoline	Gas oil	EG oil	Acetic acid 1%	Sulfuric acid 1%	Hydrochloric acid 10%
POM	◎	◎	◎	◎	◎	◎	◎	○	△

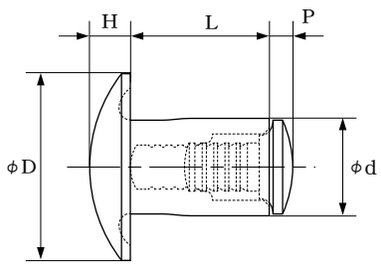
Remarks) The rivet has high resistance to chemicals except for strong acids, such as hydrochloric acid and sulfuric acid.

e-Power Rivet

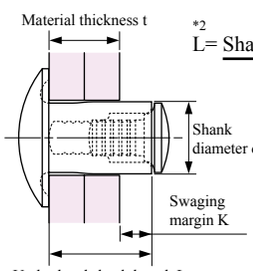


[MOVIE] http://www.byora.co.jp/index/products/movies/epower.html

Shape and symbols of standard dimensions



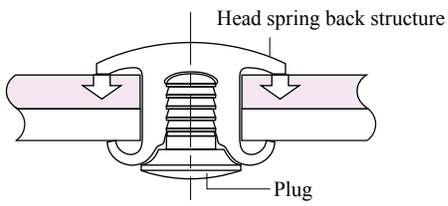
Calculation of under-head shank length



$$L = \frac{\text{Shank diameter}(d) \times \text{Coefficient}(0.6) + \text{Material thickness}(t)}{*1} \quad *2$$

*1. Shank diameter (d) x 1 = swaging margin (K)
*2. The length obtained by this calculation shall be used as a guide.

Fastening using spring back



The effect of the plug and the head "spring back structure" prevents loosening of the fastened joint.

Specification table

Unit (mm)

*1 Nomal diameter	d		D		H		P*2	L			Recommended work hole diameter		Strength(kN)	
	Standard	Tolerance	Standard	Tolerance	Standard	Tolerance	Dimension	Min	Max	Tolerance	Standard	Tolerance	Tensile	Shear
3	3	+ 0.2 − 0.1	5.8	± 0.2	1.2	± 0.1	1	5	15	± 0.2	3.2	+ 0.1 0	0.17	0.21
5	5		9.6		2.1		1.3	7	25		5.4		0.58	0.82

*1. Please ask us for different nomal diameter. *2.The P lengths are given as guidelines. (Testing ambient temperature: 23ºC)
Remarks) A selection of materials, such as POM, PP and PA, are available to suit various purposes.

Note) (1) The strength values above are results of measurement using POM.
(2) The strength may be reduced when the rivet is fastened with a low ambient temperature or when it is used for some purposes. Please ask us.

RIVET SETTER

Fukui Byora's rivet setter that meets diversified needs

Fukui Byora's rivet setter equipped with an automatic rivet feeder will dramatically improve efficiency in fastening work.

Specifications

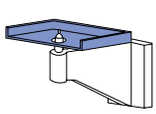
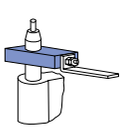
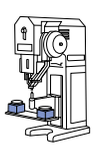
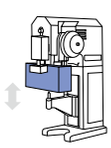
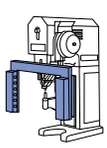
Model			RS512				RS620				RS305			
Photo														
Source voltage			Single-phase 100 VAC				Three-phase 200 VAC				Three-phase 200 VAC			
Power consumption (W)			400				400				400			
Drive system			Pressurizing by cam				Pressurizing by cam				Pressurizing by flywheel			
Takt time		50Hz	0.4s (60spm)				0.6s				0.4s			
		60Hz					0.5s				0.3s			
Allowable pressurization load			9kN				15kN				15kN			
Machine dimensions	Dimensions (mm)		W340×D585×H830				W600×D800×H1720				W600×D870×H1550			
	Arm length (mm)		200 (300or400)				320 (400)				320 (400)			
	Work height (mm)		280				967				967			
Weight			110kg				300kg				310kg			
Applicable rivet size	Semi-tubular	SW or BS or CU	Shank diameter	1.6～4.5	Max length L	12(20)	Shank diameter	3～6	Max length L	15(25)	Shank diameter	3～6	Max length L	15(30)
		SUS		1.6～3.5				3～5				3～4		
		AL		1.6～6				3～6				3～6		
	Self-piercing	SW	Shank diameter	2	Max length L	Standard size	Shank diameter	3～3.6	Max length L	Standard size	Shank diameter	3～3.6	Max length L	Standard size
		SUS		-				3～3.5				3～3.5		

Note) (1) The standard specification of our rivet setter is based on the JIS B 1215 low round head rivet fastening. When the standardized JIS B 1215 rivet has the head other than low round or the dimensions partially different from the specification (e.g., hole diameter), it shall be handled as optional specification.
(2) The figures in ( ) are optional sizes. (3) In the case of shaft diameter of 1.6 mm, the special specification may be adopted depending on type of material or length L.
(4) Trial fastening may be required depending on fastening conditions (please ask us in advance). (5) The specifications above are subject to change without notice.
(6) Specialized rivet setter can be built according to your fastening conditions. If you are interested, please consult with us.

Optional specifications

Code	Description			Code	Description
30BR	Arm length 300 mm (for RS525 only)			ALU	Pilot pin lockup system (pneumatic)
40BR	Arm length 400 mm (for all the models)			MLU	Pilot pin lockup system (mechanical)
AH	Automatic hopper			PS	Punch up/down slide mechanism
PF	Parts feeder			ARP	Rivet forced insertion system
L	L-spec: Length L up to 4 times the shank diameter			ARE	Pneumatic escape system
LL	LL-spec	RS525	Length L: 15 to 24 mm	E	Power supply specification (e.g., overseas)
		RS305	Length L: 15 to 30 mm	SP	Spotlight
		RS620	Length L: 15 to 25 mm	T2	Wheeled table (for desktop type)

Rivet setter safety devices

Workpiece holder	Lockup curling set	Two-hand control button switch	Shutter-type safety device	Photoelectric safety device
				

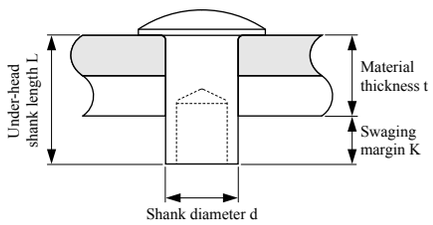
Remarks) All the safety devices above are optional extras.

Design Guidelines for Semi-tubular rivet

Calculation of rivet size

* Use the result of the calculation below as a guide.

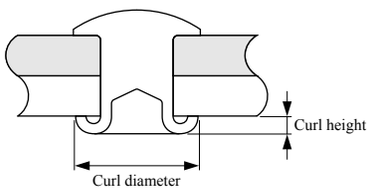
(1) Calculation of under-head shank length (guide)



$$L = \underset{*3}{\text{Shank diameter}(d) \times \underset{*2}{\text{Coefficient}(0.6)}} + \text{Material thickness}(t)$$
$$*1$$

*1. Shank diameter (d) x coefficient (0.6) = swaging margin (K)
*2. Use coefficient (0.5) as a guide for SUSXM7
*3. The under-head shank length L should be less than 5 times the shank diameter or in the case of stainless steel less than double.
(If the length exceeds the limit, it may result in buckling or any other faults.)

(2) Calculation of finished dimensions of buck-tail (guide)

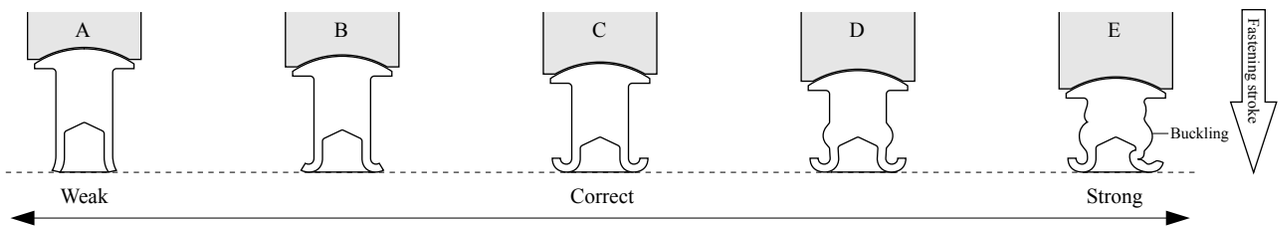


Curl diameter ≒ shank diameter (d) × 1.5

Curl height ≒ shank diameter (d) ×0.2

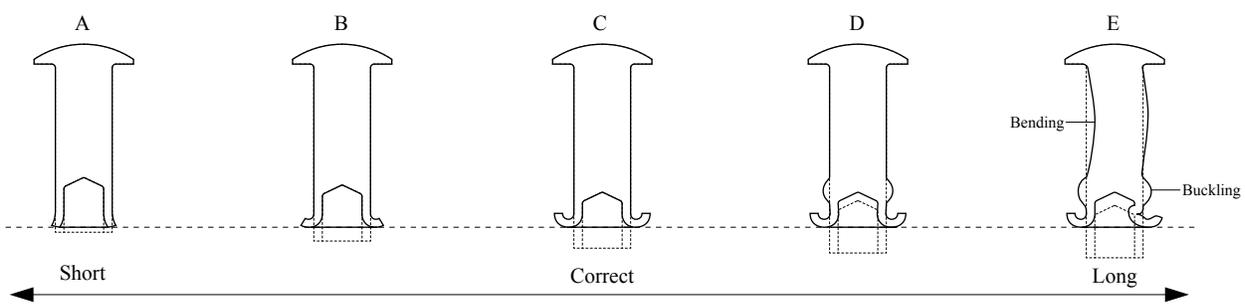
Finished conditions

(1) Fastening force (stroke)



(Fastening force is weak) When fastening force is too weak, the curl diameter will be small and the rivet strength may be reduced (example A above).
(Fastening force is strong) When fastening force is too strong, buckling may occur and it may result in defective fastening (example E above).

(2) Rivet (under-head) length



(L is shorter than correct length) When the length is too short, the curl diameter will be small and the rivet strength may be reduced (example A above).
(L is longer than correct length) When the length is too long, bending or buckling may occur and it may result in defective fastening (example E above).

Calculation of semi-tubular rivet fastening load

* The result of the calculation below shall be used as a guide.

$$F_{(kN)} = (d^2 - A^2) \times T \times K$$

d: Shank diameter (mm) A: Hole diameter (mm) T: Fastening coefficient K: Material constant

① Fastening coefficient T (Number varying with fastening force)

Fastening force	Weak	Standard (normal)	Strong
Fastening coefficient T	0.6	0.75	0.9

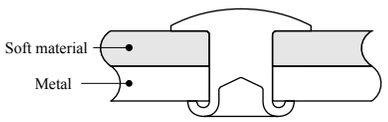
② Material constant K (Number varying with rivet material)

Material	SWCH10A	A1070W	A1200W	A5052W	A5056W	C1100W	C2700W	SUS430	SUSXM7
Material constant K	1.0	0.24	0.24	0.45	0.55	0.59	0.96	1.34	1.64

Fastening soft material

(1) The head-side workpiece is a soft material.

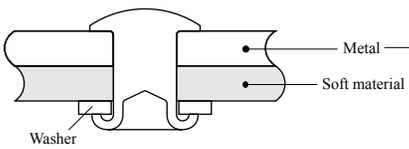
Recommendation) Use a truss rivet



As a truss rivet has a large diameter head, the workpieces are held more securely.

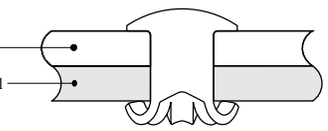
(2) The curl-side workpiece is a soft material.

Recommendation A) Use a washer on the curl side.



Using a washer with a larger diameter than curl diameter, the workpieces are held more securely.

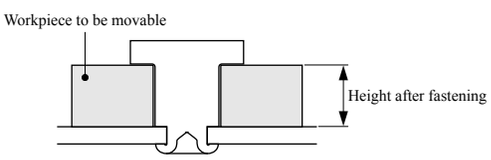
Recommendation B) Use the PL (petal) type.



The fastening diameter is larger than usual and the workpieces are held more securely.

Making the workpieces movable

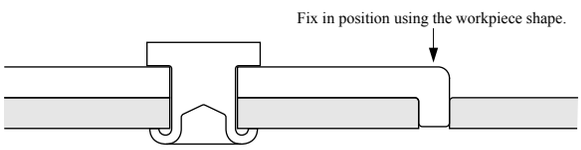
Recommendation) Use a shoulder rivet.



Choose the appropriate shoulder rivet size, considering the thickness and clearance of the workpiece to be made movable.

Preventing turning and misalignment of workpieces

Recommendation) Fix in position using two rivets.

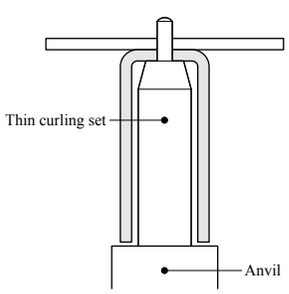


We recommend that the workpieces should be kept in position using two rivets or using the workpiece shape and fastening with a rivet.

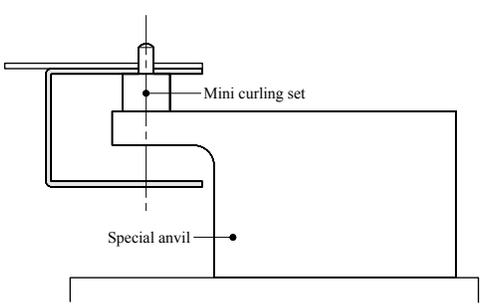
Workpieces interfere with the rivet setter (fastening jig).

* Preventive measures on the rivet setter

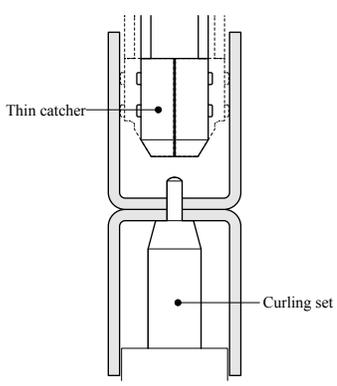
(1) Thin curling set



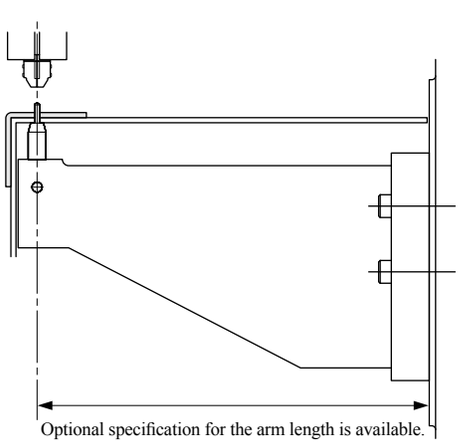
(2) Mini curling set + special anvil



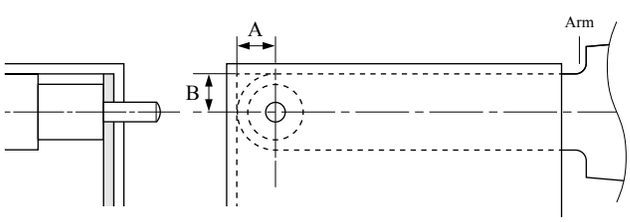
(3) Thin catcher



(4) Great arm length is required.



(5) Fastening a corner of box-shaped workpieces



The arm for holding the curling set can be machined to meet specific requirements.

* We will minimize the dimensions A and B, considering the arm strength against the fastening load.

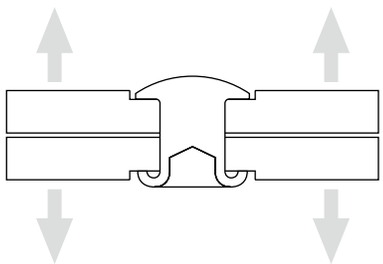
Strength Test Methods and Galvanic Corrosion

Tensile/shear strength test methods

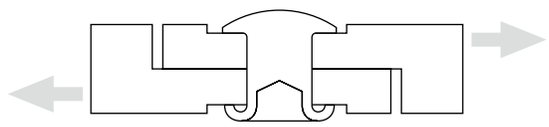
(for semi-tubular rivet)

Test conditions
[Test specimen]
- Material: Heat-treated steel plate
- Thickness: Recommended fastening range
- Work hole diameter: Recommended work hole diameter

[Testing machine]
- Testing machine: Compliant with the JIS B 7721
- Test speed: 15 mm/min



[Tensile strength test / JIS Z 3137]



[Shear strength test / JIS Z 3136]

1. Apply a load to a rivet in the arrow directions using a tension tester. Measure the maximum load the rivet withstands before it breaks.
2. The strength values given in the brochure are measurement results obtained by our testing. They may vary with the type or thickness of materials used. In designing, be sure to allow a safety factor of at least three.

Galvanic corrosion (dissimilar metal corrosion)

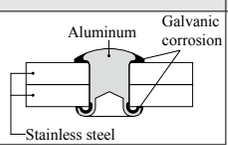
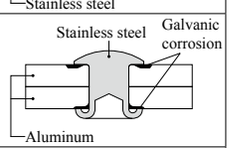
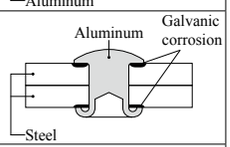
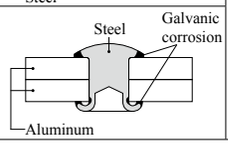
When different metals are in contact with each other, if moisture is present, a potential difference between the metals will cause partial electrification and cause corrosion. This is called galvanic corrosion. Even when the base material and the rivet fastened to it are both resistant to corrosion, when they come into contact with each other, galvanic corrosion may occur. The areas of the base material and the rivet may affect the progression of corrosion.

■ Base material and rivet for fastening

Conditions triggering galvanic corrosion	Corrosion prevention measures
The potential difference is large.	• Use materials with a smaller potential difference. • Reduce the potential difference, e.g., by plating.
Metals are in contact with moisture.	• Protect with a plastic or other insulators. • Insulate by painting.
The atmosphere is hot and humid.	• Protect with a plastic or other insulators. • Insulate by painting.
The material of the rivet is low-potential metal (base metal).	• Make sure that the material of the rivet has a higher potential (noble) than the base material.

■ Galvanic series in sea water

Potential	Metal	
-1.50	Magnesium	Base metal (corrosion side)
-1.03	Zinc	
-0.74	Aluminum (5000 series)	
-0.61	Carbon steel	
-0.45	Solder (50/50)	
-0.42	Tin	
-0.36	Brass	
-0.36	Copper	
-0.22	SUS430 (passive)	
-0.20	Nickel	
-0.15	SUS410	
-0.15	Titanium (industrial)	
-0.13	Silver	
-0.10	Titanium (high purity)	
-0.08	SUS304	
-0.05	SUS316	
0.26	Platinum	Noble metal (corrosion-proof side)

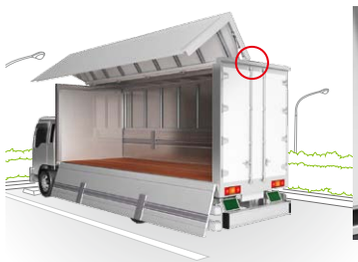
Fastening conditions (combination)		Galvanic corrosion example		Progression of corrosion	Fastening reliability
Rivet material	Workpiece material				
Aluminum	Stainless steel	Corrosion of the rivet (the area in contact with the base material) advances very fast.Example under extremely severe condition		Fast	×
Stainless steel	Aluminum	Corrosion of the base material (the area in contact with the rivet) advances. When the base material has a large area of corrosions, the progression of corrosion is relatively slow and the materials can be used depending on usage environment (please ask us).			△
Aluminum	Steel (zinc plating)	Corrosion of the zinc coat of the base material (the area in contact with the rivet) advances first and then corrosion of the rivet begins to advance. The progression of corrosion is slow and the materials can be used depending on usage environment (please ask us).			△
Steel (zinc plating)	Aluminum	Corrosion of the zinc coat of the rivet (the area in contact with the base material) advances first and then corrosion of the base material begins to advance. The progression of corrosion is very slow and the materials can be used depending on usage environment (please ask us).		Slow	○

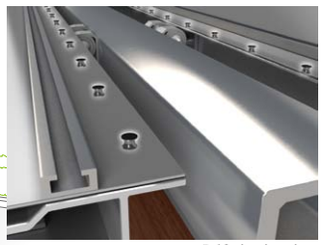
Application Examples

Application examples of various rivets

Aluminum wing roof truck

Self-piercing rivets high in strength and durability are used for assembly of large workpieces (wing roof truck).

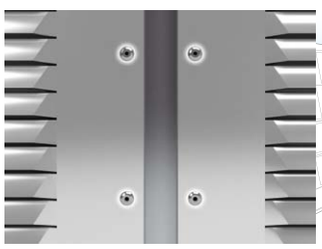


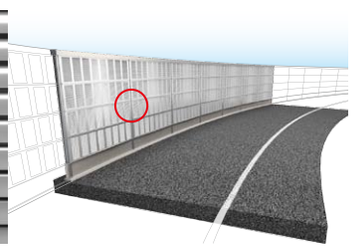


Self-piercing rivet

Noise barrier

Blind rivets are used for noise barriers for an expressway subject to severe weather conditions.





Blind rivet

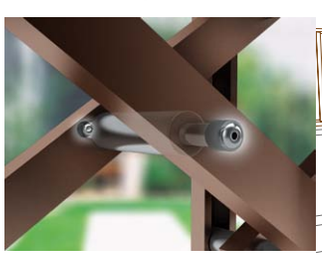
Roof

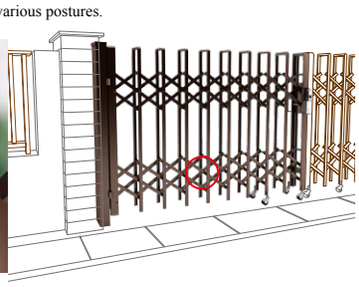
Self-piercing rivets requiring no mating hole are used for roof trusses, which require long-term durability and strength.

Self-piercing rivet

Gate

Blind rivets, which are easy to install, are used for a gate consisting of workpieces with complicated structures and when operators have to work in various postures.





Blind rivet

Louvered window

Semi-tubular shoulder rivets are used for louvered windows. The workpieces (fittings for holding panes) need to be movable after fastened.

Semi-tubular rivet

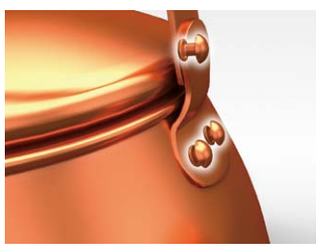
Bag

Semi-tubular rivets are used for a hand bag, which requires a decorative appearance and stable strength. The head may be shaped to original design.

Semi-tubular rivet

Cooking utensil

Semi-tubular rivets are used for cooking utensils, which are heated or cooled rapidly and which require water resistance and strength.



Semi-tubular rivet

Sample book

Roll-up rivets (plastic rivets) are an eco friendly solution. Good examples are office binders and building materials.

Roll-up rivet

PC case

Blind rivets, fastened with access to only one side, are used for workpieces with complicated contours where the rear of the joint is not accessible with a jig.

Blind rivet

Baby carriage

Semi-tubular rivets, high in stability, are used for a baby carriage that requires high fastening reliability and durability.

Semi-tubular rivet

FUKUI BYORA Co., Ltd.

Certified under ISO 9001, ISO 14001, ISO 13485, and IATF 16949

International Sales Division	6F.PMO GINZA, 8-12-8 Ginza, Chuo-ku, Tokyo 104-0061, Japan TEL: +81 3-6228-4391 FAX: +81 3-6228-4493
World Headquarters	1-7 Yamajuraku, Awara-city, Fukui 919-0898, Japan TEL: +81 776-73-1000 FAX: +81 776-73-0111
Business Headquarters	59-115 Yubinaka, Awara-city, Fukui 919-0898, Japan TEL: +81 776-75-1115 FAX: +81 776-75-1022
Tokyo Branch	5F.PMO GINZA, 8-12-8 Ginza, Chuo-ku, Tokyo 104-0061, Japan TEL: +81 3-6278-8736 FAX: +81 3-6278-8746
Osaka Branch	Dojima Avanza 5F, 1-6-20 Dojima, Kita-ku, Osaka-shi Osaka 530-0003, Japan TEL: +81 6-6225-8387 FAX: +81 6-6225-8386
Nagoya Branch	NFC Marunouchi Building 12F, 1-17-29 Marunouchi, Naka-ku, Nagoya-city, Aichi 460-0002, Japan TEL: +81 52-265-7201 FAX: +81 52-265-7205

Overseas Group Companies

BYORA U.S.A. CORPORATION	733 Bishop Street, Suite#1280 Honolulu, Hawaii 96813 U.S.A. TEL: +1 808-585-9755 FAX: +1 808-585-9756
FUKUI BYORA SINGAPORE PTE. LTD.	No51 Bukit Batok Crescent, #08-23, Unity Centre Singapore 658077 TEL: +65 6756-9210 FAX: +65 6257-7510
FUKUI BYORA (THAILAND) CO., LTD.	Amata City Rayong, Industrial Estate 7/413 Moo 6 Tambon Mabyangporn, Amphur Pluakdaeng, Rayong, 21140, Thailand TEL: +66 38-02-7591~3 FAX: +66 38-02-7594
FUKUI BYORA HONG KONG CO., LTD.	Unit 902, Westley Square, 48 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong TEL: +852 2331-8305 FAX: +852 2305-2799

www.byora.co.jp

E-mail: internationalsales@byora.co.jp

For quick access to Fukui Byora's website, scan the QR code on the right with your smartphone or tablet.