

”HANA for All” “All for HANA”



www.hanagigun.com

HANA GIGUN

The world's first patented Lock Flange®
Prevention of bolt/nut loosening

Based on the piping construction experience and know-how accumulated over 30 years in the field, HaNagigun realizes the zero of the bolt/nut loosening phenomenon and aims to realize a safe workplace without LEAK accidents.



HANA GIGUN

Through continuous R&D that can provide complete solutions from general industrial sites to offshore, industrial plants, refineries, chemicals, gas, aviation, and power generation, we have excellent technologies for design, production, and quality.

Pioneering domestic and overseas markets

Management Philosophy



Sincerity, trust, consideration and innovation
are the core values of HaNa gigun Co., Ltd.



Sincerity

Pursuing corporate value by being true without lie



Trust

Building trust between companies with faith and loyal



Consideration

Extreme mindset for others and other Companies



Innovation

Infinite challenge to change for corporate growth and win-win .

Company Overview

Company name	❖ HANA GIGUN Co., Ltd	Funding Date	❖ April, 2018
CEO	❖ Duck-Gyun , Kim	Business No.	❖ 441 – 81 - 01043
Head office/Factory /R&D center	❖ 111-7, Bangchuk-gil, Godeok-myeon, Pyeongtaek-si, Gyeonggi-do, Korea	Industry / production items	❖ Manufacturing, construction, rental ❖ Lock Flange <registered trademark>
Capital	❖ \$167,000	Contact Point	❖ 82-031-618-4262 ❖ email : hanagg4262@naver.com
Business Item	❖ Manufacturing / Steelworks / Plant facilities / Engineering services /Environmental facilities	홈페이지	❖ www.hanagigun.com

Patent registration & certification

Patent	❖ Domestic Patent : 2 ❖ Domestic Trademark : 1 ❖ Domestic Design : 1	Certification	❖ ISO 9001 certification ❖ Venture company certification ❖ R&D department certification (Koita) ❖ Smart factory certification
	❖ application patent : 4 ❖ application Design : 2 ❖ PCT international Application : 2		❖ Under the R&D Center certification

History

2020

- Lock Flange Application on site of Pyeongtaek Factory of Samsung Electronics
 - Completed serial production system for Lock Flange
 - Smart factory certification
 - Headquarters and factory expansion and relocation

2018

- Established Hana gigun Corporation
- Recognized as an excellent technology evaluation company
- Acquired quality management certification (ISO 9001:2015)
 - piping manufacturing for Samsung Electronics, & Samsung Electro-Mechanics

2016

- Established Hanagigun('16.6)
- piping manufacturing for Samsung Electronics

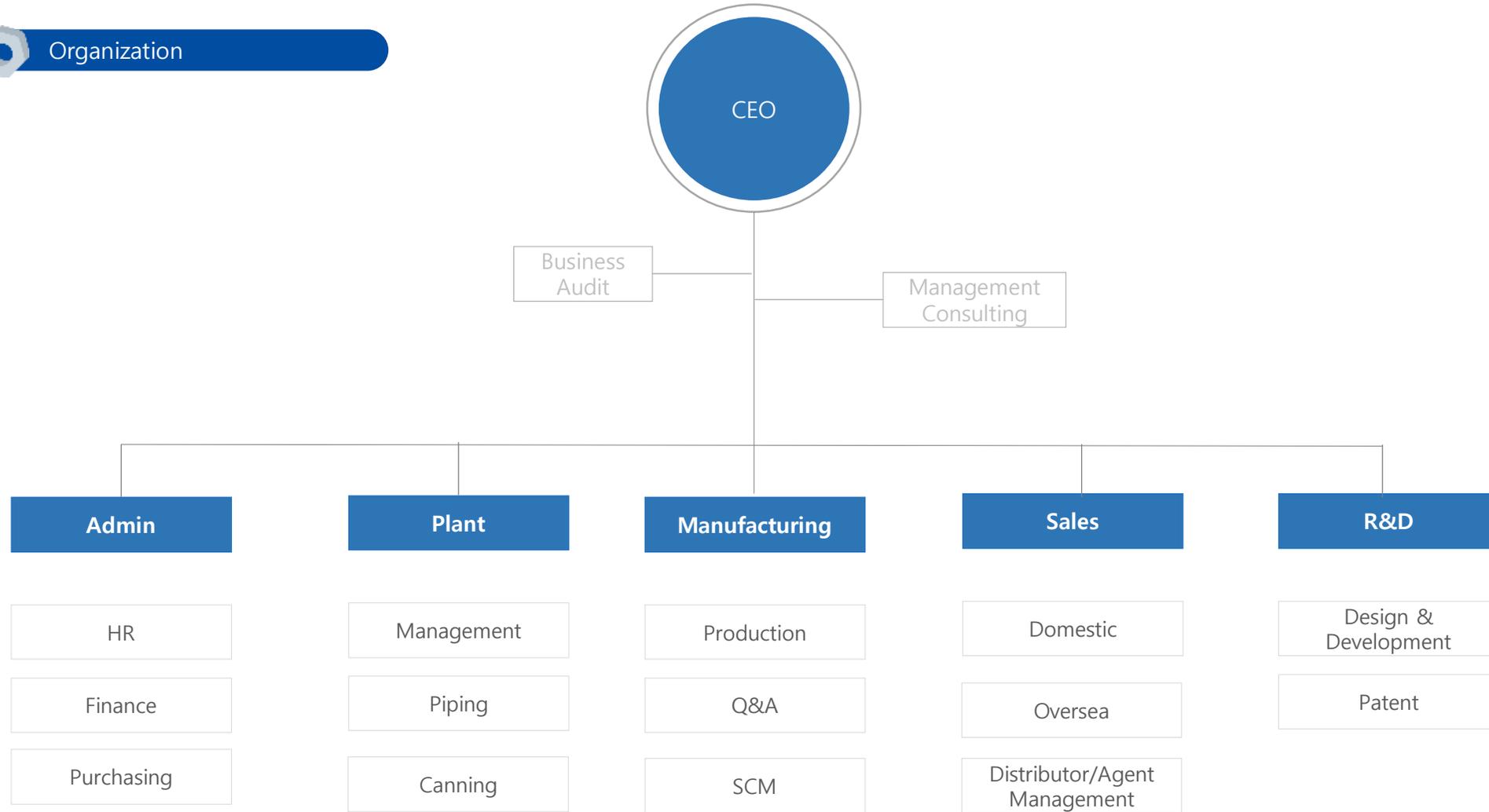
2019

- Lock Flange registered a domestic patent
- Design and trademark registration
- Venture company certification
- R&D department certification
- piping manufacturing Samsung Electronics, & Samsung Electro-Mechanics

2017

- piping manufacturing for Samsung Electronics, & Samsung Electro-Mechanics

Organization



Business Area



Lock Flange Manufacturing
&
Distribution Sales



PE pipe Flange fastening
construction



Piping and manufacturing supplied
to Samsung Semiconductor

Major Customer



Flange market - Domestic / Overseas

(Source: KATS National Institute of Technology, 2016))

Domestic	Market size	Market Outlook
Korea	KRW 300 billion (Source: Korea Customs Service)	-국내 플랜지의 약 70~80%가 수입물량 유통
OVERSEA	Market size	Market Outlook
Germany	KRW 62 trillion	- Energy Industry Expands Demand for Wind Power
China	KRW 10 trillion 800 billion	- Natural gas. Large-scale investment in natural oil gas pipelines
USA	KRW 177.5 billion	- Expected to increase investment by increasing demand for renewable energy
Saudi Arabia	KRW 61.6 billion	- Demand for replacement due to plant expansion, maintenance, etc.
Japan	KRW 42.2 billion	- Expansion of overseas production and procurement by price increase

I Necessity of anti-loosening products

Factories and plants is composed of numerous piping facilities, as a method of connecting pipes of a certain length to each other, a flange is provided at the end of the pipe and a method of fastening with a bolt and a nut is widely used. However, in the state of being fastened with bolts and nuts, self-rotating loosening occurs **due to the external environment and conditions**, and the resulting decrease in fastening force leads to a leak phenomenon, causing enormous economic loss, especially fatal accidents caused by leakage of chemicals and dangerous substances.

I Cause of Self Rotational Loosening of Bolt Nut

- ❖ Vibration and external force applied to the flange assembly

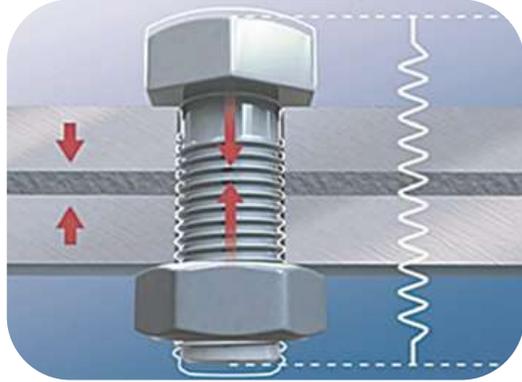
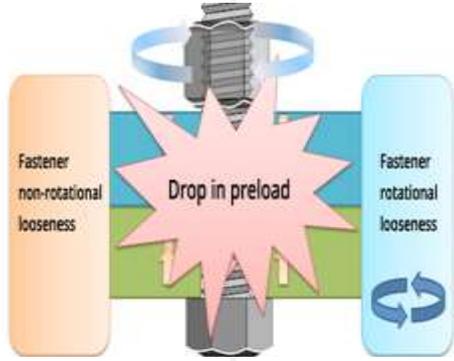
The dominant factor is that relative displacement repeatedly in the direction perpendicular to the bolt shaft.



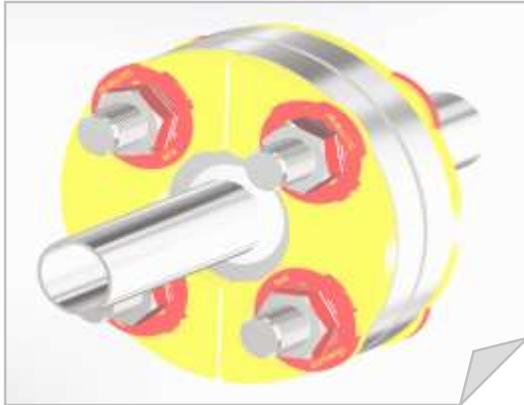
Therefore,

a perfect bolt nut loosening prevention device is essential for all flanged joints for piping,.

I Type of loosening-Cause-Countermeasure

	Non-Rotational Loosening	Rotational Loosening
Type of Loosening		
Causes	<ul style="list-style-type: none"> ❖ Temperature change ❖ Deformation of gasket ❖ Deformation of fastened parts 	<ul style="list-style-type: none"> ❖ Vibration and external force applied to the flange assembly → The dominant factor is that relative displacement repeatedly in the direction perpendicular to the bolt shaft.
Countermeasure	<ul style="list-style-type: none"> ❖ Design measures required -Flange, bolt nut, gasket structure and material selection -Proper tightening torque setting 	<ul style="list-style-type: none"> ❖ Use of anti-loosening parts 1. Anti-loosening parts acting independently of the tightening torque ex) Lock Flange 2. Anti-loosening parts acting on the tightening torque ex) Nord lock washer, Heico washer, spring washers, etc. 3. Nuts using Prevailing Torque ex) Hyper lock, nylon nut, etc. 4. Adhesive ex) Loctite

■ Double Lock Flange



- Consists of a pair of round, rock flanges
- When tightening bolts/nuts, due to washer, NO damage affect on Lock Flange itself, and the flange to be fastened.
- Rotating restraining force acts by combining circumferential teeth on the Lock Flange base and cap
- Bolt/nut loosening ZERO

■ One Lock Flange

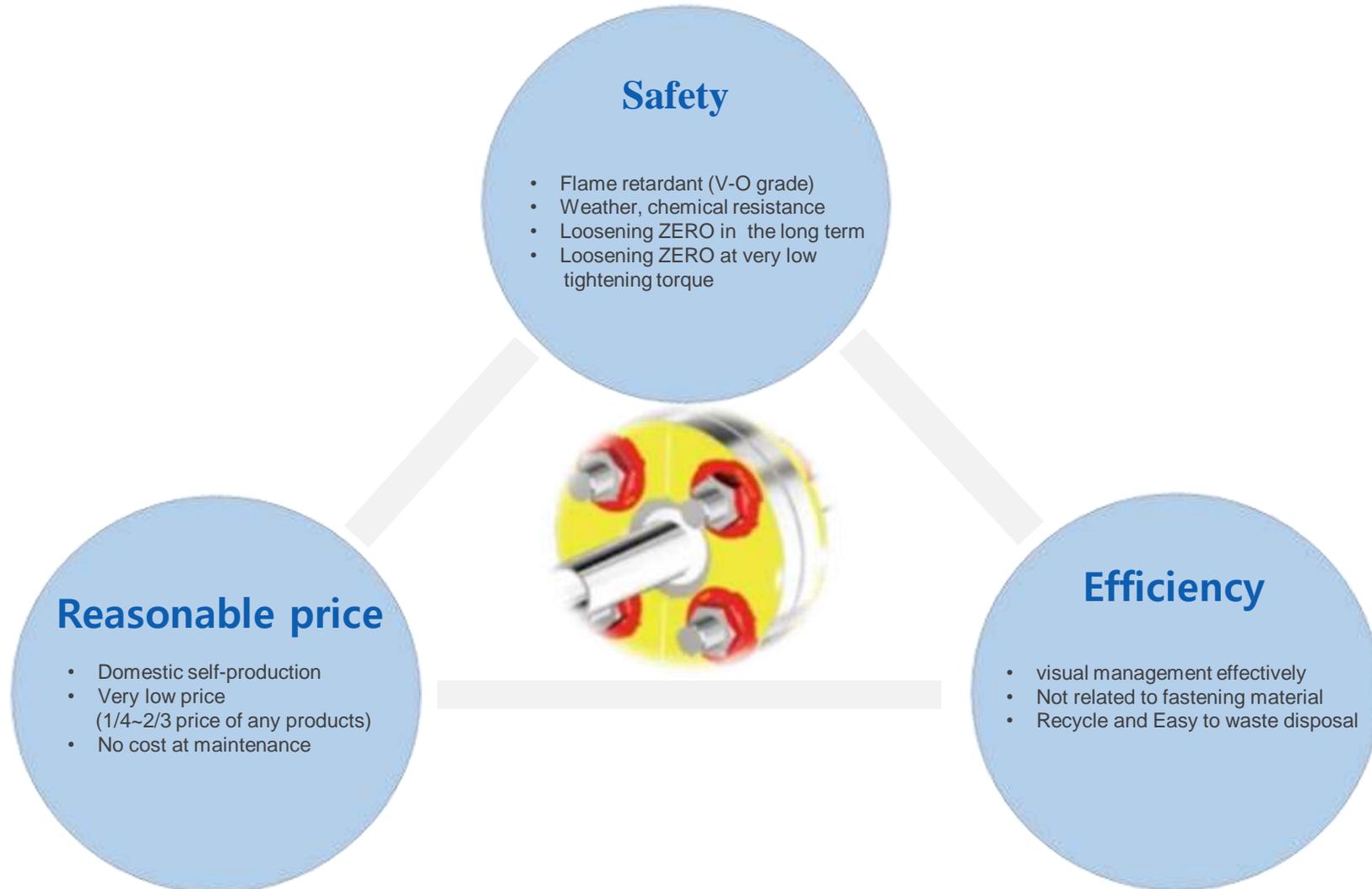


- Individually tightened one by one
- Flange and Lock Flange are connected without affecting the lock flange itself
- The anti-rotation teeth are fixed with the L Flange base and the cap (female and male).
- Anti-rotation stopper acts as Anti-rotational torque
- Bolt/nut loosening ZERO

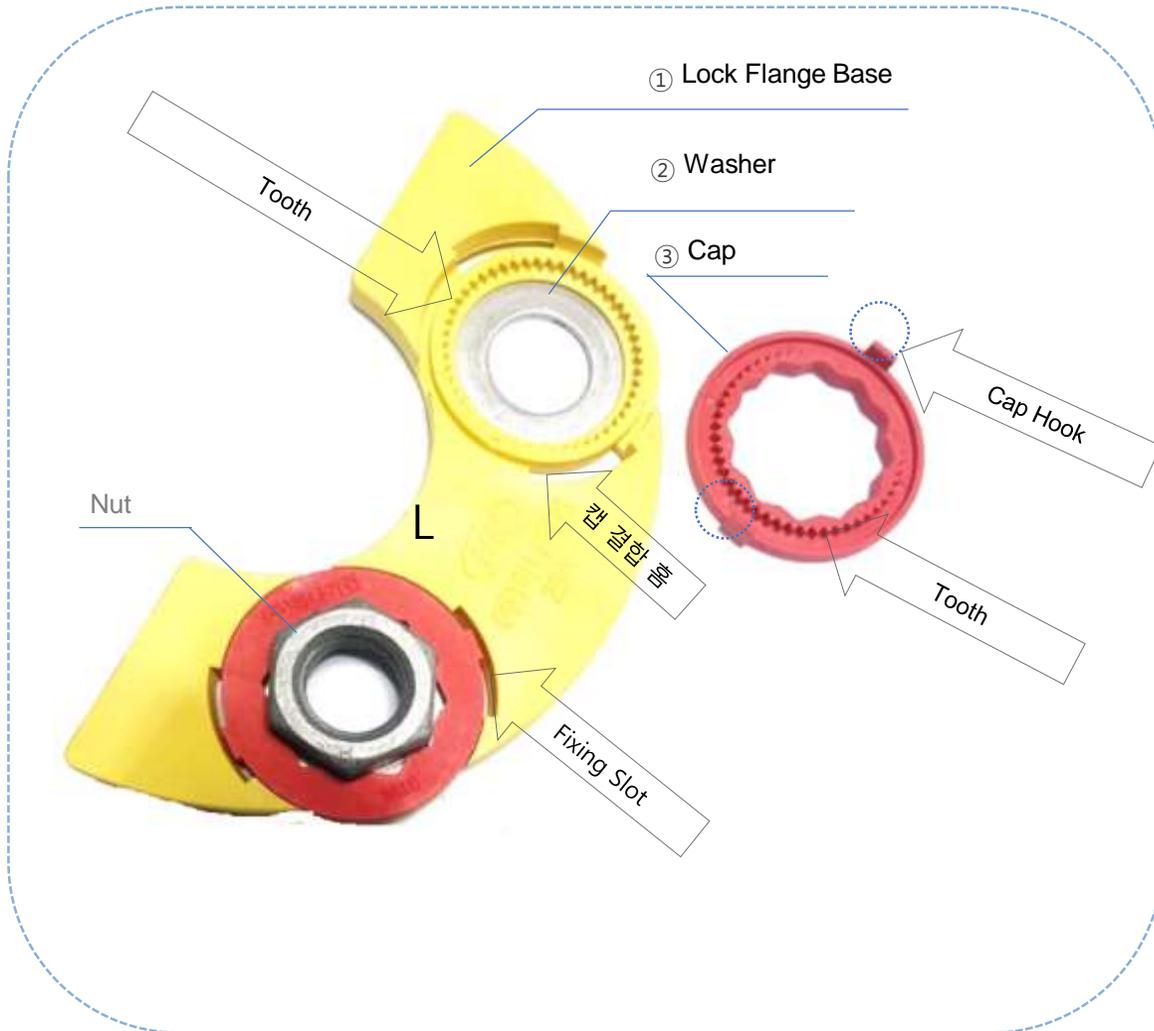
Feature of Lock Flange

제품명	Existing product (Washer , Nut)	Lock Flange
Manufacturer	Domestic and overseas companies	HaNa gigun Co., Ltd.
Anti-loosening effect	Some or full loosening occur	No loosening
Locking feature	Anti-loosening function influenced by tightening torque	100% anti-loosening effect regardless of tightening torque
unit price	High price (imported one)	Low price (2/3 ~ 1/4 compared to existing products)
Maintenance cost	Periodic check for loosening and increasing re-fastening costs	None
Used Materials	metal materials, hardening and additional parts needed	Plastic and stainless plate .High-strength nylon material, regardless of the base material .Flame-retardant material (V-O grade) .Chemical resistant material
Conditions of use & environment	Washer usage conditions: - Use of anti-seize lubricants in parallel - Tightening over the specified torque (required condition) - Insufficient anti-loosening effect under low torque condition - The strength of the washer must be higher than that of the base material (mandatory condition)	Regardless of the terms and conditions (PE,PVC,PVDF,PFA, STS)
Constructability	- Coupling state between upper and lower washers Visual management is essential (No anti-loosening effect if it deviates) - Frequent re-tightening due to poor torque value	Color management with flange - Easy visual management - No need to fasten with specified torque - Fine adjustment of the assembly angle of the nut is required when combined with teeth
recycle	Not to reuse after tightening due to wear	• Easy to reuse and waste treatment

I Special Advantage



Double Lock Flange- structure



No	Parts	ea	Details
①	Lock Flange Base	1	<ul style="list-style-type: none"> Plastic injection Anti-rotation tooth processing
②	Washer	2	<ul style="list-style-type: none"> Insert injection into Lock Flange Base
③	Cap	2	<ul style="list-style-type: none"> 12 grooves and teeth processing

Assembly procedure and status

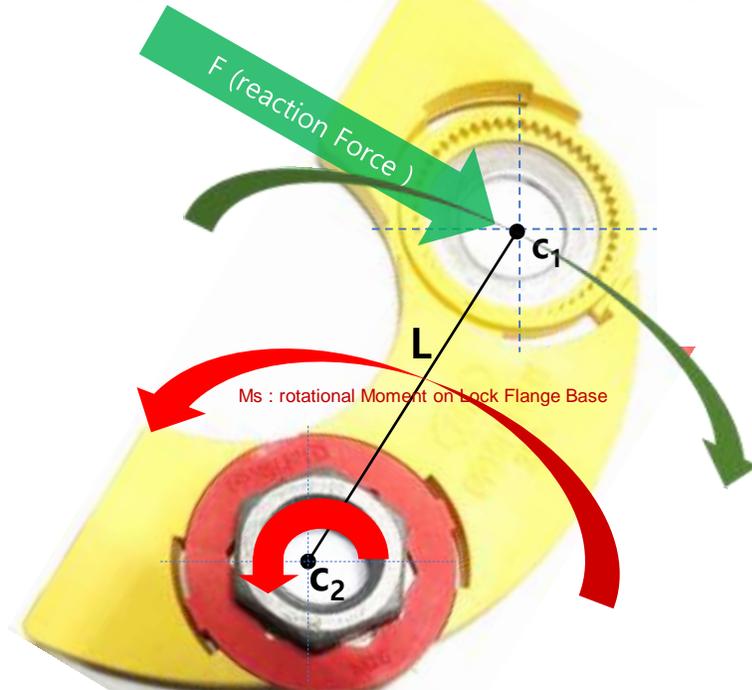
- Fully tightened Lock Flange Base ① on the flange surface to be connected with nut/bolt

 - ▶ The lock flange base does not come off because the washer ② was combined.
 - ▶ the Same as normal bolt/nut tightening process
- the nut (bolt) is assembled with the 12 grooves formed on the ③ cap, at the same time, assembled together with the teeth formed on the cap and on the lock flange base.

 - ▶ The Nut (Bolt), Cap, and Lock Flange Base are assembled integrally with the flange to be connected

Double Lock Flange _ Mechanism of Zero loosening

$Mr = L \times F$
(Anti -loosening Moment against self loosening moment)



Ms (Self loosening Moment of bolt/nut)

Mechanism of Zero loosening – Double Lock

- When the self-loosening moment (M_s) of the nut /bolt assembled in each of the 12 grooves formed in the cap acts in the loosening direction,
- the rotational moment (M_s) acts on the Lock Flange Base around C_2 .
- where the bolt located at the distance L is supported and as the reaction force is generated so,

the reaction moment (M_r) corresponding to the self loosening moment (M_s) acts to maintain the **equilibrium ($M_s=M_r$)**.

▶ self-Loosening phenomenon of Nut (bolt) is ZERO

- This operation mechanism is applied to two bolted joints and acts as an **anti-rotation function by interacting with two support points (C_1, C_2)**.

One Lock Flange – Structure

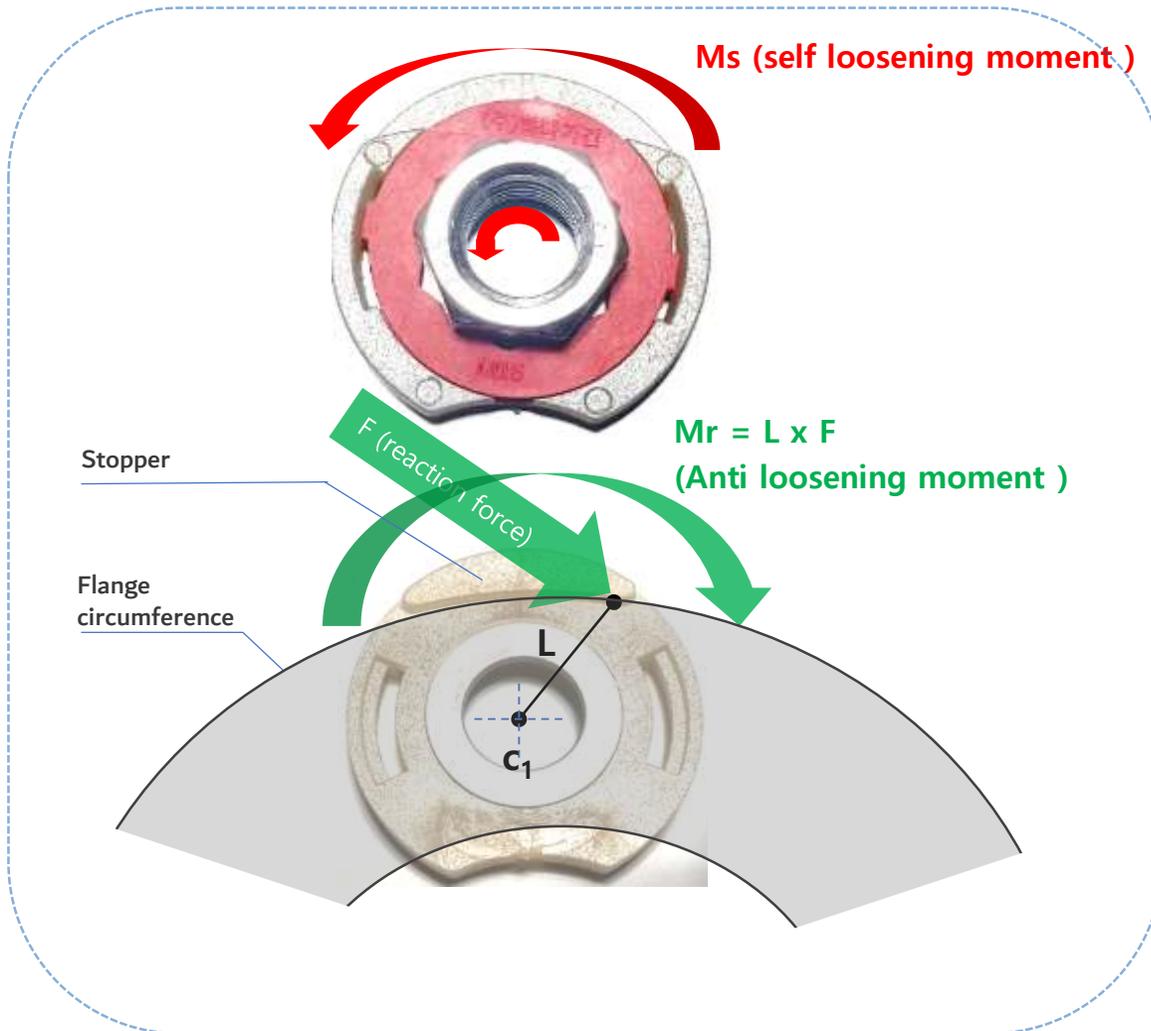


No	Parts	ea	Details
①	Lock Flange Base	1	<ul style="list-style-type: none"> Plastic injection Anti-rotation tooth processing
②	Washer	1	<ul style="list-style-type: none"> Insert injection into Lock Flange Base
③	Cap	1	<ul style="list-style-type: none"> 12 grooves and teeth processing

Assembly procedure and status

- Lock Flange Base ①) on the flange surface to be connected with each bolt/nut completely tightened.
- The Lock Flange Base is assembled on the flange and integrated.
 - ▶ Lock Flange Base fastened with bolt nut to flange
 - ▶ Same as normal bolt/nut assembly
- The nut (bolt) is assembled with the 12 angle grooves formed on the ③ cap, at the same time, assembled together with the teeth formed on the cap and on the lock flange base.
 - ▶ The nut (bolt), Cap, and Lock Flange Base are assembled integrally with the flange to be connected

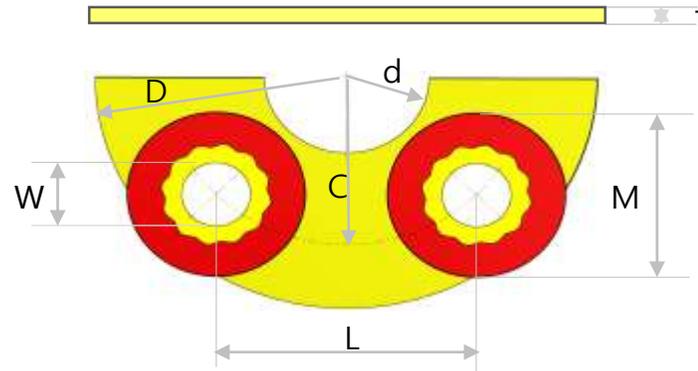
One Lock Flange _ Mechanism of Zero loosening



Mechanism of Zero loosening – One Lock

- When the nut or bolt assembled in each of the 12 grooves formed in the Cap acts self loosening moment, the rotation moment acts on the lock flange base around C1.
- At this time, it acts reaction force at the contact point between circular surface of Flange and Lock Flange stopper distance L and the anti-rotation force corresponding to the self loosening moment(Ms) is applied to maintain the equilibrium (Ms = Mr)
- ▶ **self-Loosening phenomenon of Nut (bolt) is ZERO**
- This operation mechanism is applied to each bolted joints **individually**.

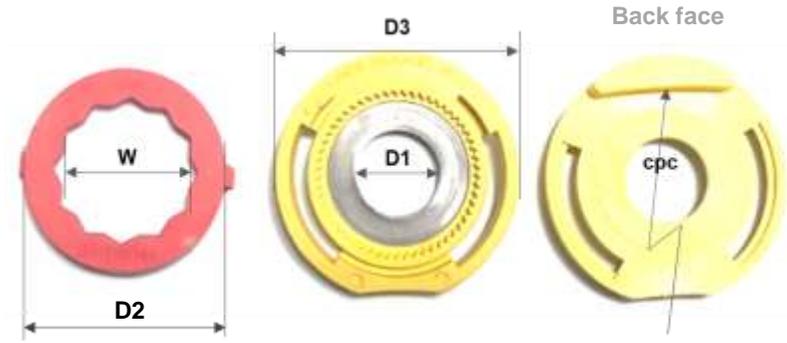
Lock flange specification -Double Lock



- Applied on Flange for steel , PE pipe, etc
- Large diameter size is available

Flange Size	Bolt Size (Metric)	Required L Flange quantity	(W) inner Dia. of Washer (mm)	(C) bolt Hole center diameter (mm)	(L) distance between holes (mm)	(M) Outer Dia. Of CAP (mm)	(D) Outer Dia. of L. Flange (mm)	(d) inner Dia. of L. Flange (mm)	t thickness
15A	M12	4	12.5	70	49.48	33	95	35	6.5
20A				75	53.01		100	40	
25A	M16	4	16.5	90	63.61	39	125	50	6.5
32A				100	70.68		135	58	
40A				105	74.22		140	63	
50A				120	84.82		155	78	
65A				140	98.96		175	96	
80A				150	57.37		185	108	
100A				175	66.94		210	133	
125A	M20	8	20.5	210	80.32	48	250	158	8.0
150A				240	91.80		280	185	
200A				290	75.02		330	235	
250A	M22	12	22.5	355	91.84	50	400	300	
300A		16		400	78.00		445	345	
350A				445	86.77		490	390	

Lock flange specification -One Lock



Flange		Thread	Required L Flange	D1	W	D2	D3	CPC		
size	The No of Hole	Matric	One L Flange	inner Dia. of Washer (mm)	Wrench size (mm)	Outer Dia. Of CAP (mm)	Outer Dia. Of base (mm)	Dia. Of Contact point circle (mm)		
15A	4	M12	8	12.5	19	33	44	95		
20A										
25A	4	M16	8	16.5	24	39	49	124		
32A										
40A										
50A										
65A										
80A									8	16
100A										
125A	8	M20	16	20.5	30	48	59	280		
150A										
200A									12	24
250A	12	M22	24	22.5	32	50	62	400		
300A									16	32
350A										

Vibration endurance test – Ktl (Korea Testing Laboratory)

- ❖ The Purpose of testing: Endurance and Breage Tor. Of Lock Flange
- ❖ Test Condition and Result

No	Vib. Condition			Test Result	Breakage Torque test result
	Frequency	Acceleration	Cycles		
1st	30Hz	2g	30,000	No Loosening /Breakage	<ul style="list-style-type: none"> • Min,. Breakage Tor. : 139.4 N-m • Max. Breakage Tor. : 324.7 N-m
2nd	30Hz	10g	30,000	No Loosening /Breakage	
3rd	500Hz	30g	30,000	No Loosening /Breakage	

❖ Test Report



Vib Test

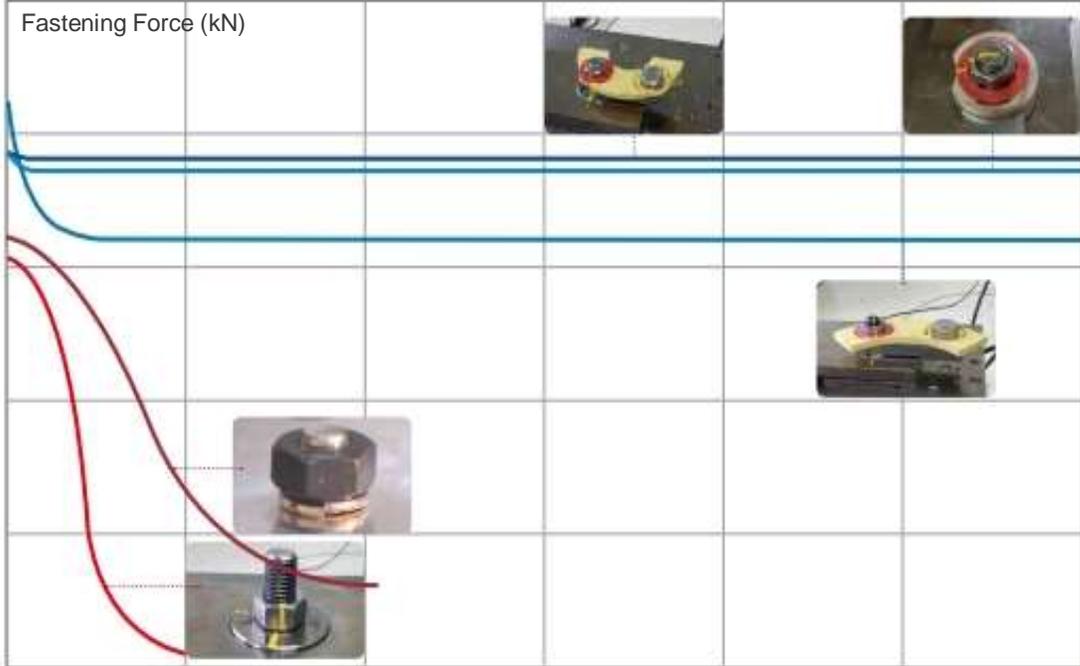


Tir. Test



Junker test (DIN65151) – Supported from Lim Jin ST

- ❖ The Purpose of testing: Anti - self loosening performance
- ❖ Test Condition and Result

Test	Test Condition (DIN65151)			Test Result
	Frequency	Displacement	Test time	
 <p>M16 Double L. Flange</p>	12.5Hz (750 rpm)	±0.8mm	300 sec (3750 cycle)	 <p>Fastening Force (kN)</p> <p>Time(sec)</p> <p>— Spring Washer+ Nut — Nut — M16 Double Lock — M20 Double Lock — M16 One Lock</p>
 <p>M16 One L. Flange</p>		±0.8mm		
 <p>M20 One L. Flange</p>		±1.0mm		

| Registered Patent

Domestic Patent #1



Domestic Patent #2



Design



PCT # 1



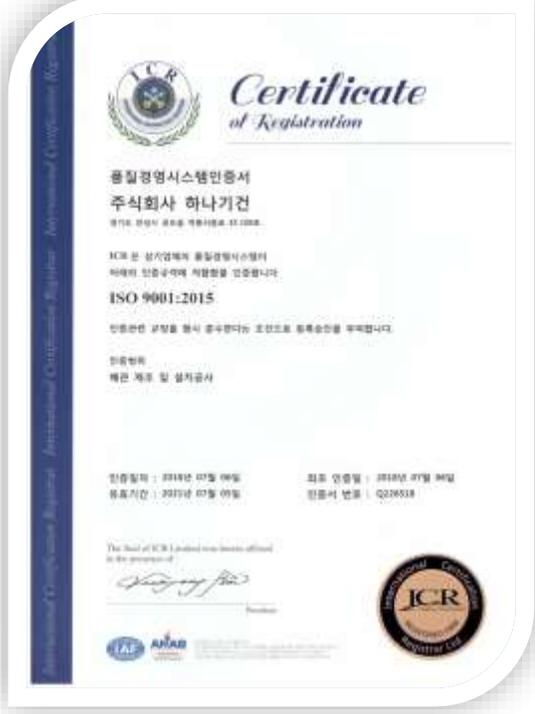
Venture company



R&D development Dep.



ISO9001 system



Excellent technology company



THANK YOU

(주) 하나기건

세계 최초 3D 프린팅
골프 / 테니스 클럽빌리지

