

1.0 Purpose/Scope

- 1.1 The purpose of this document is to provide work instructions for the Kleko360 Fasteners.
- 1.2 This document outlines the instructions for the 0432, 0532, 0632, 0732, 0832, 1032 and 1232 Kleko360.

2.0 Responsibilities and Authorities

- 2.1 Any competent person can perform these tasks.
- 2.2 The Kleko360 Operations Manager is responsible for maintaining this process.

3.0 References and Definitions

- 3.1 N/A

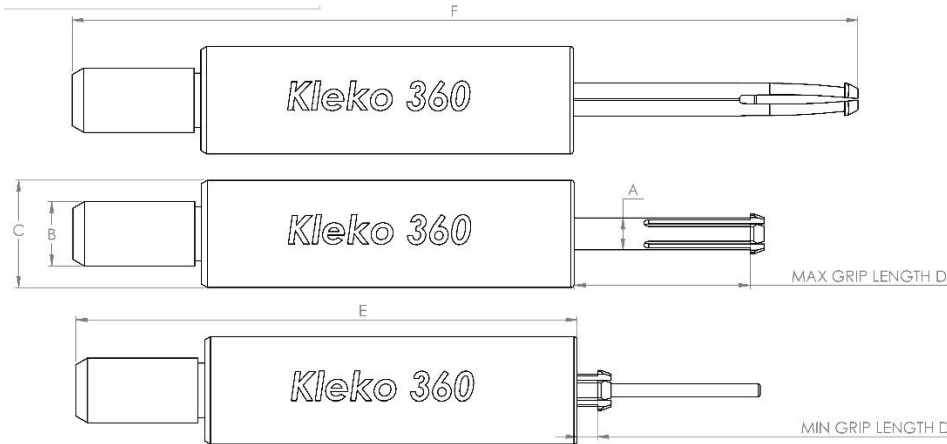
4.0 Resources

- 4.1 Specification

Kleko360 - image



Kleko360 - drawing



5.PATENT NO:

EP2247862
US8517650
GB2455635

Kwikbolt Part Number	HOLE Diameter			DIAMETER (A)				DRIVE		BODY		GRIP RANGE (D)		E		F		G	CLAMP LOAD		INSTALL TORQUE #					
	Nominal	Inch	mm	Max Diameter	Min Diameter	Ø B	Ø C	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		COLOUR	lb	N	lb*in	Nm			
K360-0432-000-026-FXCB-Y	1/8	0.125	3.18	0.126	3.20	0.122	3.10	0.113	2.86	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	YELLOW	148	660	4.4	0.5
K360-0532-000-026-FXCB-N	5/32	0.156	3.97	0.157	4.00	0.153	3.89	0.144	3.65	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	PINK	148	660	4.4	0.5
K360-0632-000-026-FXCB-B	3/16	0.188	4.76	0.189	4.80	0.185	4.69	0.175	4.45	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	BLUE	303	1350	13.3	1.5
K360-0732-000-026-FXCB-S	7/32	0.219	5.56	0.220	5.60	0.216	5.48	0.204	5.19	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	GREY	303	1350	13.3	1.5
K360-0832-000-026-FXCB-G	1/4	0.250	6.35	0.268	6.80	0.247	6.27	0.236	5.98	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	GREEN	303	1350	13.3	1.5
K360-1032-000-026-FXCB-W	5/16	0.313	7.94	0.331	8.40	0.310	7.86	0.298	7.57	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	WHITE	453	2015	17.7	2.0
K360-1232-000-026-FXCB-O	3/8	0.375	9.53	0.394	10.00	0.372	9.45	0.361	9.16	3/8	9.53	5/8	15.88	0	0	1.020	26	2.910	74	4.330	110	ORANGE	453	2015	17.7	2.0

= recommended install torque and corresponding clamp load for optimal product life cycle (Kleko360 will produce much higher clamp loads if required).

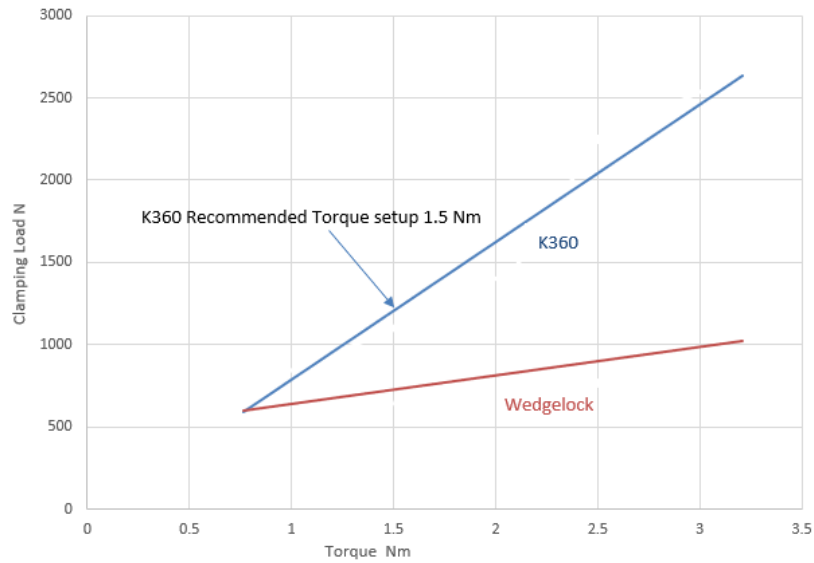
- 4.2 Cleaning Instructions are also provided as part of the WI process, please see section 6 below.
- 4.3 Kleko360 fasteners operational temperature range 20 degrees +/- 20 degrees

4.4 Fastener Performance

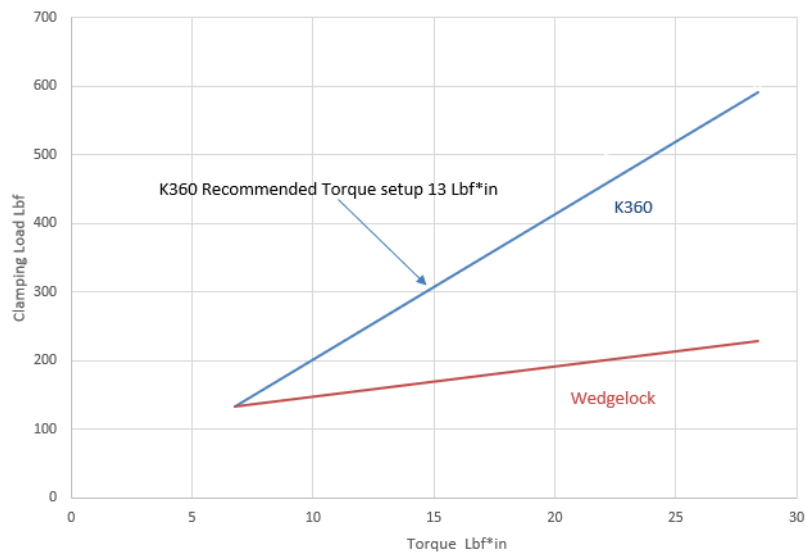
The graphs below shows the loads achieved both in N and Lbf for Kleko360 fasteners and a standard competitor for two diameters 3/16" (4.76mm) and 1/4" (6.35mm) as an example of performance.

3/16" (4.76mm) (0632) Diameter fasteners.

Clamp Load N v Torque Nm - 3/16" (4.76mm) (0632) Diameter fasteners

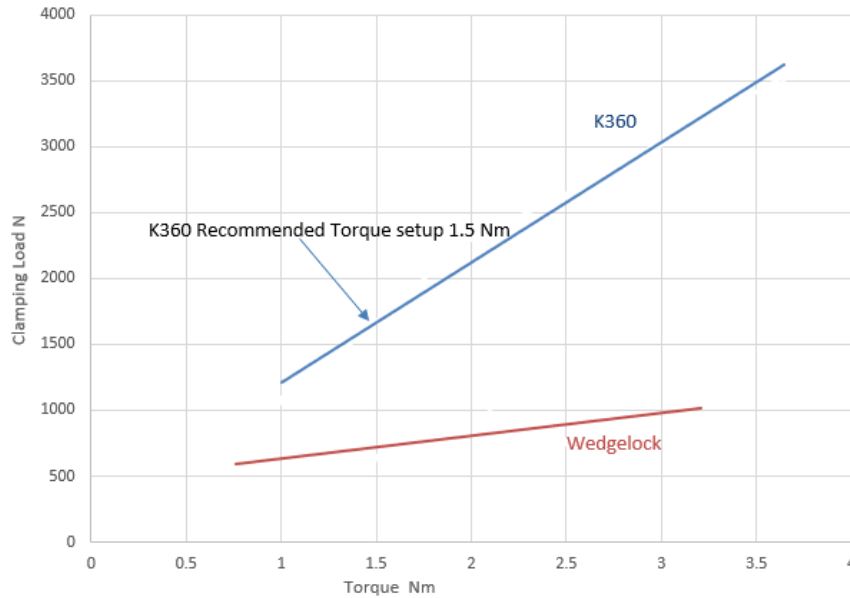


Clamp Load lbf v Torque lbf*in - 3/16" (4.76mm) (0632) Diameter fasteners

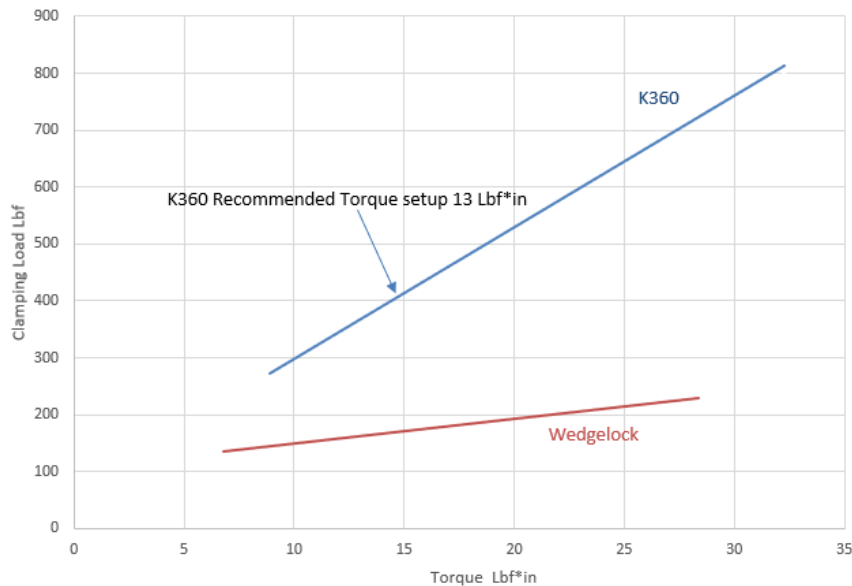


1/4" (6.35mm) (0832) Diameter fasteners

Clamp Load N v Torque Nm - 1/4" (6.35mm) (0832) Diameter fasteners



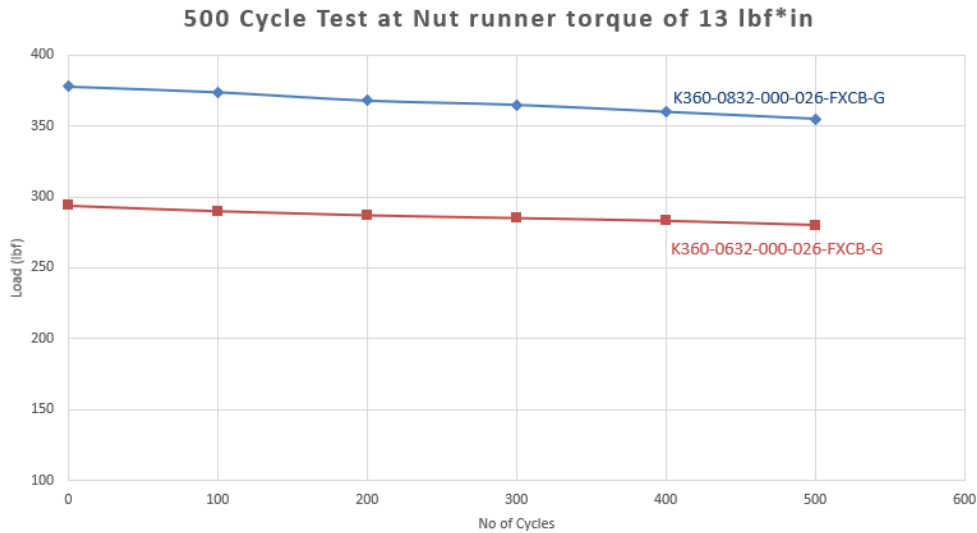
Clamp Load lbf v Torque lbf*in - 1/4" (6.35mm) (0832) Diameter fasteners



As can be seen from the graph the Kleko360 clamping load is approximately 2 times the competitors for the same torque such as a Wedgelock or Cleco.

4.5 Cycle testing

The graph below shows the loads achieved during testing of 500 cycles for both the K360-0632-000-026-FXCB-B and K360-0832-000-026-FXCB-G. All tests were carried out at 13Lbf*in (1.5Nm).



Average loads are shown above. The loads achieved are consistent to the expected loads for the Kleko360 with little drop off (around 5%) over the 500 cycles.

While the Kleko360 fasteners will achieve much higher clamping loads as shown in the graphs previously the number of cycles at those loads will drop off and it is for the customer to decide on a longer life Kleko360 or a higher performance Kleko360.

Kleko360 Work Instructions

4.6 Recommendation of Nut Runner Setting

Kleko360 recommends a installation torque as per the table below to achieve the optimum clamping loads and fastener life (Higher clamp loads are achievable). In most applications this should be the settings required and used.

Ensure the chosen nut runner has a torque tolerance +/- 0.05 Nm for best results.

Installation Torque Nm (lbf*in)	Min Torque Nm (lbf*in)	Max Torque Nm (lbf*in)
0.5 (4.4)	0.45 (3.9)	0.55 (4.8)
1.5 (13.3)	1.45 (12.8)	1.55 (13.7)
2.0 (17.7)	1.95 (17.1)	2.05 (18.0)

Each fastener has an optimized installation torque to produce the perfect clamp load that will ensure maximum product life. Below are the Kleko360 recommended install torque and corresponding clamp force for each part number (please note that higher clamp loads can be achieved but this will impact fastener life and possibly damage structures being clamped).

Fastener Part Number	Installation Torque Nm (lbf*in)	Clamp Force Nm (lbf)	Product Life Cycles
K360-0432-XXX-XXX-FXCB-Y	0.5 (4.4)	660 (148)	500
K360-0532-XXX-XXX-FXCB-N	0.5 (4.4)	660 (148)	500
K360-0632-XXX-XXX-FXCB-B	1.5 (13.3)	1350 (303)	500
K360-0732-XXX-XXX-FXCB-S	1.5 (13.3)	1350 (303)	500
K360-0832-XXX-XXX-FXCB-G	1.5 (13.3)	1350 (303)	500
K360-1032-XXX-XXX-FXCB-W	2.0 (17.7)	2015 (453)	500
K360-1232-XXX-XXX-FXCB-O	2.0 (17.7)	2015 (453)	500

5.0 Instructions

The Kleko360 has a similar function as a standard Wedgelock however provides a full dowel (complete hole fill), a larger clamp area, higher loads and uses a direct drive mechanism to maximize performance. Below are the work instructions for function.

5.1 Kleko360 starting position for installation.



5.2 Insertion and removal of Kleko360.



Step 1 - Place Kleko360 into Kleko360 / Wedgelock adapter holder ready for insertion into hole.



Step 2 - Insert Kleko into hole and sit flush.

Step 3 - Press the nut runner trigger to activate the Kleko360 (recommended nut runner torque are advised in section 4.6 of this document).

5.3 Kleko360 clamping on blindside.



The Kleko360 will clamp on the blindside as shown above.

For removal activate the reverse switch and then complete the steps above in reverse. Before removal always ensure that the Kleko360s legs are fully extended (as shown below) so that the Kleko can be removed smoothly from the hole.



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5.4 Comparison of the Kleko360, Kwikbolt | Lightning and the traditional Wedgelock / Cleco.

Comparison Based on fastener size of 3/16 th (0632)	Traditional Wedgelock/Cleco (baseline)	Kleko360	Indicator	Kwikbolt Lightning	Indicator
Max Recommended Clamping Load	1,300 N (300Lbf)	2,600 N (600Lbf)	▲ 200%	2,600N (600Lbf)	▲ 200%
Clamp Surface Area	2mm ²	6mm ²	▲ 300%	4.5mm ²	▲ 225%
Cycle Time	4 sec	4 sec	—	6 sec	▼ 50%
Labour Saving	(baseline)	High	✓	High	✓
Shear strength	10N	8,000N	▲ 800%	10,000N	▲ 1,000%
Dowelling	Poor	Good	✓	Very High	✓
Panel Damage at high clamp load	High	Low	✓	Low	✓
Automation	Poor	Good (protruding only)	✓	Excellent (countersunk or protruding)	✓
Surface protrusion	High	High	—	Very Low Profile or Fully Flush	✓
Usage	50	500	▲ 1,000%	500	▲ 1,000%
Cost	\$10 (£8)	\$30 (£24)	X 3	\$100 (£80)	X 10

6.0 Cleaning Instruction

This cleaning instruction has been developed as a guide to undertake a deep clean of the Kleko360 fastener. Due to the wide-ranging application of Kleko360 fasteners, the level and type of soiling varies considerably. This set of work instructions details the procedures and chemicals that can be used to remove general soiling, however, may not successfully remove all soiling. It is recommended to undertake the procedure below first to identify the success of the cleaning and review. If soiling remains, contact Kleko360 with information of current cleaning process, duration of cleaning process and photographs. Kleko360 can provide feedback and recommendations to improve the cleaning process tailored to your application.

Equipment & Chemicals:

The equipment detailed in this work instruction is recommended. If substitute / different equipment is available to what is recommended, contact Kleko360 for advice and recommendations.

The chemicals detailed in this work instructions are recommended. Due to geographical location, some chemicals may not be easily accessible / available. Contact Kleko360 for advice and recommendations to source alternatives.

Health and Safety:

These work instructions are considered a guide to undertake the cleaning of the Kleko360 product. A full risk assessment must be undertaken prior to cleaning to ensure all handling of chemicals and use of equipment is aligned to the original equipment manufacturers guidelines. If the procedure in this work instruction contradicts that of the chemical / equipment manufacturers' guidelines, contact Kleko360 for advice.

Cleaning Trials:

It is strongly recommended to undertake the initial cleaning process on a single fastener, review the success and modify the process where necessary to identify the process that works best for the specific fastener soiling type. Once all checks after cleaning have been completed to determine the success of the cleaning, only then should higher volumes of fasteners be processed at the same time.

Kleko360 Work Instructions

Equipment

Type	Description	Notes
Pre Wash Scrubbing Brush	Used prior to pre wash	A firm tooth brush or similar is ideal. Note. Brush becomes heavily soiled quickly and will need to be replaced regularly.
Compressed air source	Compressed air gun with small tip (ideally 6mm in diameter or less) with regulator control allowing accurate discharge of compressed air	Small tip assists in dislodging objects from the fastener prior to pre washing
Ultrasonic bath cleaner	See separate table below	
Pre wash Sink / Container	10L or above	Plastic container / stainless sink works well. Should allow for easy draining / replacement of liquid.
Ultrasonic Bath	Temperature Controlled Time Controlled	Minimum 2L volume
Extraction	Suitable extraction	Suitable extraction / ventilation should be provided to allow dust created from use of compressed air gun / steam from ultrasonic bath to be safely extracted.
Rinse Sink / container	10L or above	Plastic container / stainless sink works well. Should allow for easy draining / replacement of liquid.
Drying Cloth	Blue roll / paper towel	
Cotton tipped wooden applicators	Longer length allows for easier application	
Kleko360 Nut Runner	Kleko360 approved nut runner	Capable of cycling the Kleko360
All necessary personal protective equipment		

Recommended Ultrasonic Bath Detergent / Lubrication

Product Name	Manufacturer	Contact Details
Aquasolv Ultrasonic Cleaner Plus	Mykal	www.mykal.co.uk
Super Bee 300LFG	Cee-Bee	www.mcgean.com
SW-3 Ozzy Juice Truck Grade Degreasing Solution	Durst Industries Pty Ltd	www.durst.com
Boelube 70104	Aerospace and Engineering Tools Ltd	https://www.aetools.co.uk/

Kleko360 Work Instructions



Cleaning Procedure

Stage	Process	Description	Notes
1	Mechanical soil removal	Using the pre wash scrubbing brush remove as much soil from the fastener as possible.	Ensure suitable extraction is available
2	Compressed air soil removal	Using the compressed air source, remove as much soil from the fastener as possible.	Ensure suitable extraction is available
3	Pre wash	Fill pre wash container / sink with warm water. Place fastener into warm water and allow to soak for at least 1 minute. Using pre wash scrubbing brush, remove as much soil as possible from the fastener.	Frequently drain, clean and refill the pre wash container as this water typically becomes soiled quickly.
4	Ultrasonic Bath wash	Fill ultrasonic bath with water and add ultrasonic bath cleaning detergent as per manufacturers' guidelines. Set temperature to approx. 40°C (unless otherwise stated by manufacturer). Place fastener into bath. Turn on ultrasonic function for 5 minutes. Remove fastener and review success of cleaning. Repeat 5 minute cycle if required / until soil is removed.	
5	Rinse	Fill rinse sink / container with warm fresh water. Soak fastener for at least 1 minute.	Frequently drain, clean and refill the rinse container as this water typically builds up a concentration of the ultrasonic bath detergent.
6	Drying	Using compressed air source, dry fastener. Use absorbent blue paper towel to remove final residue of water.	It is important to ensure fastener is dried quickly to avoid any build-up of corrosion.
7	Inspection	Inspect fastener for any remaining soil. If soil is still present go back to step 4.	
8	Final inspection & Testing	Cycle fastener with Kleko360 nut runner to ensure legs of fastener run freely along complete stroke of fastener.	
9	Lubrication	Using the manufactures safety instructions once cleaning is finished dip to cover fastener in Boelube 70104 , leave to dry for 24hr before use.	

7.0 Opportunities and Risks

7.1 Employees must comply with all Health and Safety requirements.

8.0 Revision History

Rev	Date	Section	Paragraph	Summary of change	Authorized by
A	9/9/2020			Initial issue	
B	01/10/2020	4.6	Tables	Torque conversion to lbf*in corrected	
C	10/02/2021	1.2, 4.1, 4.4, 4.5, 4.6, 5.4	All tables and copy	Add in complete fastener range	