User's Guide

CANNON 12K™

1325 CARDEN FARM DRIVE | CLINTON, TN 37716 | 865.670.3713 | ITOOLCO.COM

GENERAL SAFETY RULES

WARNING! Read and understand all instructions. Failure to follow all instructions listed below may result in electric shock, fire, and/or serious personal injury.

SAVE THESE INSTRUCTIONS

WORK AREA SAFETY

Keep your work area clean and well lit. Cluttered benches and dark areas invite accidents.

Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Power tools create sparks which may ignite the dust or fumes.

Keep bystanders, children, and visitors away while operating a power tool. Distractions can cause you to lose control.

ELECTRICAL SAFETY

Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.

Avoid body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerators. There is an increased risk of electric shock if your body is grounded.

Do not expose power tools to rain or wet conditions. Water entering a power tool will increase the risk of electric shock.

Do not abuse the cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately. Damaged cords increase the risk of electric shock.

When operating a power tool outside, use an outdoor extension cord marked "W-A" or "W." These cords are rated for outdoor use and reduce the risk of electric shock.

PERSONAL SAFETY

Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.

Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts. Loose clothes, jewelry, or long hair can be caught in moving parts.

Avoid accidental starting. Be sure switch is off before plugging in. Carrying tools with your finger on the switch or plugging in tools that have the switch on invites accidents.

Remove adjusting keys or switches before turning the tool on. A wrench or a key that is left attached to a rotating part of the tool may result in personal injury.

Do not overreach. Keep proper footing and balance at all times. Proper footing and balance enables better control of the tool in unexpected situations.

Use safety equipment. Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

TOOL USE AND CARE

Use clamps or other practical way to secure and support the workpiece to a stable platform. Holding the work by hand or against your body is unstable and may lead to loss of control.

Do not force tool. Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it was designed.

Do not use tool if switch does not turn it on and off. Any tool that cannot be controlled with the switch is dangerous and must be repaired.

Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the tool. Such preventive safety measures reduce the risk of starting the tool accidentally.

Store idle tools out of reach of children and other untrained persons. Tools are dangerous in the hands of untrained users.

Maintain tools with care. Keep cutting tools sharp and clean. Properly maintained tools, with sharp cutting edges, are less likely to bind and are easier to control.

Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tool's operation. If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.

Use only accessories that are recommended by the manufacturer for your model. Accessories that may be suitable for one tool may become hazardous when used on another tool.

SERVICE

Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in a risk of injury.

When servicing a tool, use only identical replacement parts. Follow instructions in the "Maintenance" section of this manual. Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electric shock or injury.

BEFORE OPERATION OF THIS TOOL, READ AND UNDERSTAND ALL OF THE INSTRUCTIONS AND SAFETY INFORMATION IN THIS MANUAL

Contents

SAFETY FIRST

Safety is essential in the use and maintenance of this tool. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

SAFETY ALERT SYMBOLS

This symbol is used to call your attention to hazards or unsafe practices that could result in injury or property damage. The three signal words, defined below, indicate the severity of the hazard. The message after the signal word provides the information for preventing or avoiding the hazard.

DANGER

Immediate hazards that, if not avoided, WILL result in severe injury or death.

WARNING

Hazards that, if not avoided, COULD result in severe injury or death.

CAUTION

Hazards or unsafe practices that, if not avoided, MAY result in injury or property damage.

IMPORTANT SAFETY INFORMATION

WARNING

Read and understand all instructions and safety information in this manual before operating or servicing this tool.
Also read the instruction manual supplied with your drill.
FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH

WARNING – PERSONAL SAFETY HAZARDS

Only qualified persons should use iTOOLco Cannon 12K.
Wear eye protection and hard hat when using this tool.
Do not use this tool while tired or under the influence of drugs, alcohol, or medication.
Keep body parts and loose clothing away from moving parts and pinch points. Keep hands away from capstan.
Always follow operating procedures.
FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH.

WARNING – ELECTRICAL SHOCK HAZARDS

Do not expose power tools to rain or wet conditions. Water entering a power tool can increase the risk of electric shock. Plug into a (GFCI) ground fault interrupted circuit outlet only. Use a 20 Amp 120 Volt extension cord no more than 100 feet in length. Maintain proper care of power cords. Do not use the cord to carry the tool or pull the plug from an outlet. Replace damaged cords immediately. Damaged cords can increase the risk of electrical shock. Do not use this tool near live circuits. Shut off and lock out power when working near existing circuits. FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH.

WARNING – ENTANGLEMENT HAZARD

Do not operate this tool while wearing loose-fitting clothing. Retain long hair.

Keep hands away from pullers capstan. Rope at capstan can pinch or crush a hand or body part.

FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH.

WARNING – TIPPING HAZARD

Use the same size adapter with conduit. Disassemble when not in use. FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH.

WARNING – TOOL USE HAZARDS

Use this tool for manufacturer's intended purpose only. Use other than that which is described in this manual can result in injury or property damage.

Inspect all aspects of the wire pull to ensure safety, including the cable puller, booms, sheaves, rope, swivels, pins, etc. and replace any defective components.

Always inspect structural integrity of any supports, conduit, anchoring system, etc. that will hold the cable puller during the wire pull. These supports should be able to withstand the maximum pulling force of the cable puller plus a safety factor of 3:1. A 12,000 lb. wire puller should be anchored to a support that can withstand 36,000 lb. of pull.

Only qualified personnel should use pulling equipment.

Do not use the cable puller as a hoist or winch. The cable puller cannot lower a load and may fall causing serious injury or death.

Do not exceed load rating of cable puller, rope, or accessories.

Always plug into a grounded receptacle with a 20 amp GCFI protected circuit. Do not modify plug provided.

Always disconnect cable puller before servicing.

FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH. **(CONTINUED)**

WARNING – TOOL USE HAZARDS (continued)

Do not operate cable puller in wet or damp locations. Do not expose to rain.

Do not operate in an explosive atmosphere.

Some components of the mobile cable pulling package exceed 50 lb. and will require more than one person to lift, transport, or assemble.

Always inspect pins to be sure they are the correct part number for the assembly and are fully inserted through holes and have spring clips properly attached. Do not substitute any other object for factory supplied pins.

When making a vertical pull, keep the area underneath the cable puller clear of all personnel.

Use caution during assembly and disassembly of boom components. Keep pins in place to avoid uncontrolled movement. Have control of boom components before removing any pins.

Always ensure factory supplied boom tubes are fully inserted into the receiver tubes and that the spring loaded boom pins are fully engaged.

Do not switch between low and high speeds while the foot pedal is depressed.

Always make sure the puller has completely stopped before switching from low to high speed or high to low speed.

Do not alter this cable puller. Doing so will void the warranty.

Guards and safety features are provided for your protection.

Do not use an extension cord longer than 100'. Extension cord should be a minimum of 12 gauge wire with ground.

FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH.

WARNING – ROPE HAZARDS

Do not use nylon or polypropylene rope, extreme force can be stored when rope stretches. Inspect all aspects of the rope before each use.

Only use 9/16” diameter or larger double braided composite pulling rope with a minimum average breaking strength of 32,000 lb.

Pulling rope should be the only thing in contact with the capstan. Never let swivels, grips, etc. come in contact with the capstan.

Keep as much rope confined in conduit as possible. This will help prevent injury should the rope break.

Do not wrap rope around any body parts. Do not wrap rope around wrists.

Always keep rope away from operator’s feet.

Rope must always be pulled over a rotating sheave. If a sheave does not rotate, turn cable puller off immediately and determine problem before continuing the pull.

Never allow rope to slip on a rotating capstan for more than a couple of seconds. The rope will wear in that spot and could break under pressure. If you need to stop the pull, turn the cable puller off and tie the rope off to hold it in place until you restart the pull.

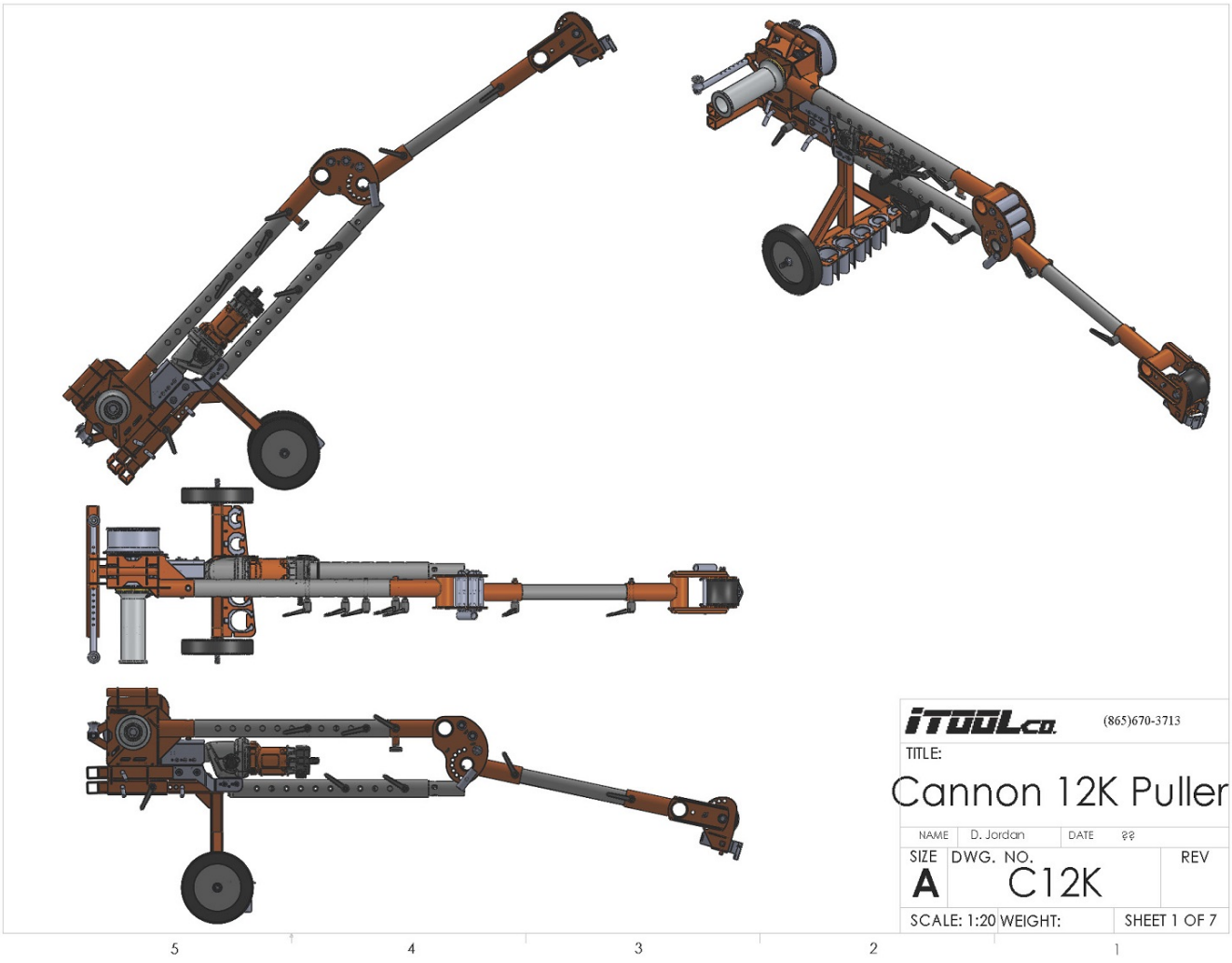
Never allow rope to overlap on the capstan. If this condition begins to occur, immediately release the tailing force on the rope. To do this, stop the cable puller, switch to reverse gear, unload capstan, stop puller again, place in forward gear, and finish the pull.

The pulling rope must come in contact with all the sheaves used in the boom system.

FAILURE TO OBSERVE THESE WARNINGS CAN RESULT IN SEVERE INJURY OR DEATH.

DESCRIPTION AND IDENTIFICATION

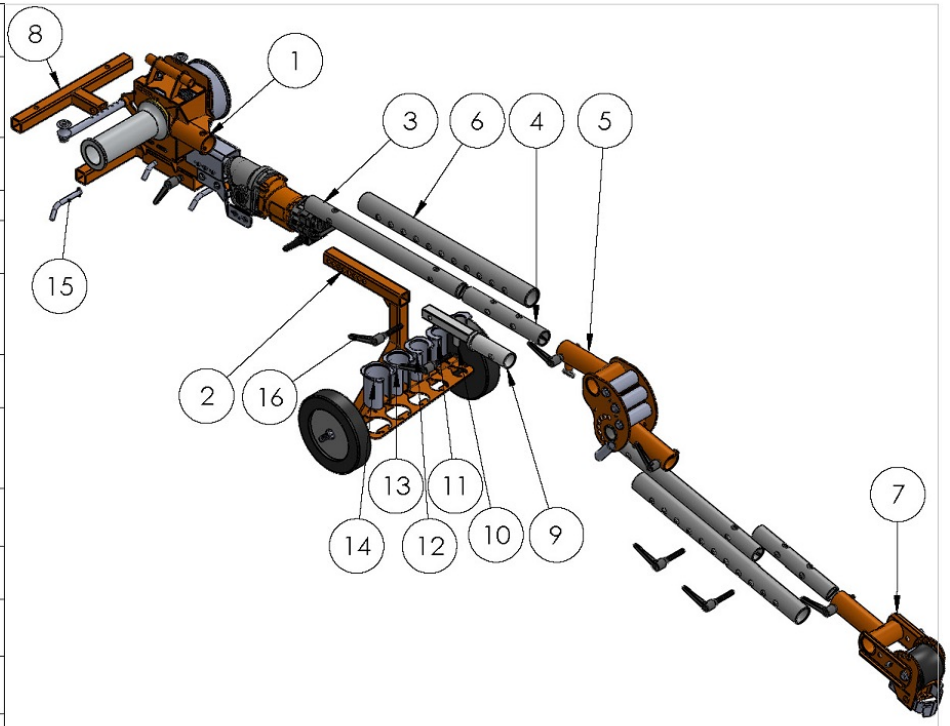
The ITOOLco Cannon 12K is a 12,000 lb. cable puller intended to pull medium to large wire through conduit. It sets up in only minutes, and is a dual capstan, four-speed puller. The Cannon 12K can pull at speeds up to 36 feet per minute. It does not need to be anchored to the ground, and is easy for one person to set up, transport, and operate.



Gearbox Base Unit BOM

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	C10K-413.2	Gearbox bottom frame	1
2	GB-002.1	12K Gearbox	1
3	C10K-420.2	Gearbox Top W/Handles	1
4	HW-240	M10 low head 10K gearbox mount bolts	16
5	C10K-426	Shark fin	1
6	SP-118	Motor coupling gearbox side	1
7	SP-120	Spider coupling	1
8	SP-119	Motor coupling motor side	1
9	SP-157	10K motor spacer coupling	1
10	SP-103	Output Shaft	1
11	SP-117	10K capstan spacer	1
12	SP-126	10K Brass bearing	1
13	C10K-424	Motor coupling housing	1
14	SP-128	10K High torque capstan	1
15	HW-316	10 x 12 mm x 12"L Key stock	1
16	C10K-422	Reciever hitch adapter	1
17	SP-127	10K High speed capstan	1
18	HW-196	1-3/8" flat washer	1
19	HW-202	1-3/8" lock washer	1
20	HW-204	1-3/8" 6T hex nut	2
21	HW-166	1/2" Flat Washer	8
22	HW-144	3/8" 16t x 4" Hex bolt	2
23	HW-306	1/2" 13T x nyloc nut	2
24	SP-185	5/8" Bent Hitch Pin	1
25	HW-123	1"- .25 roll pin	3
26	C10K-423	Rope roller tube	1
27	HW-254	1/2" X 3"L Clevis pin	2
28	HW-166	1/2" flat washer	4
29	HW-222	1/8" cotter pin	2
30	SP-109	Rope roller	2
31	SP-180	1/4" Pin w/ retainer	1
32	C10K-241.3	Motor base plate	1
33	SP-233	12K 3 Speed Motor w/ Reverse	1
34	C10K-425.4	Motor Mount	1
35	HW-120	1/4"-20t x 7/8" hex bolt	4
36	HW-126	1/4" flat washer	16
37	93070A171	M8 low head 6K gearbox mount bolts	4
38	SP- 123	5/8" x 3"L Adjustable handle	1
39	HW-128	1/4 20 Nyloc nut	4
40	HW-315	# 10 Self Tapping Screw	6
41	.25 roll pin	.25 roll pin	1
42	C10K-247.2	Shaft cover	1

ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	Gearbox Base Unit	Gearbox Base unit (see pg. 2)	1
2	C10K-603	Wheeled frame	1
3	C12K-405	30" Extension	2
4	C12K-404	15" Extension tube	2
5	C10K-617	Main roller complete assembly	1
6	C12K-406	33" Extension tube	2
7	C10K-608	Front Knuckle 2.0 Fully Assembled	1
8	C10K-422	Reciever hitch adapter	1
9	C10K-431	Extension Holder	1
10	CK-20	2" Conduit Adapter	1
11	CK-25	2.5" Conduit Adapter	1
12	CK-30	3" Conduit Adapter	1
13	CK-35	3.5" Conduit Adapter	1
14	CK-40	4" Conduit Adapter	1
15	SP-185	5/8" Bent Hitch Pin	2
16	SP- 123	5/8" x 3"L Adjustable handle	4



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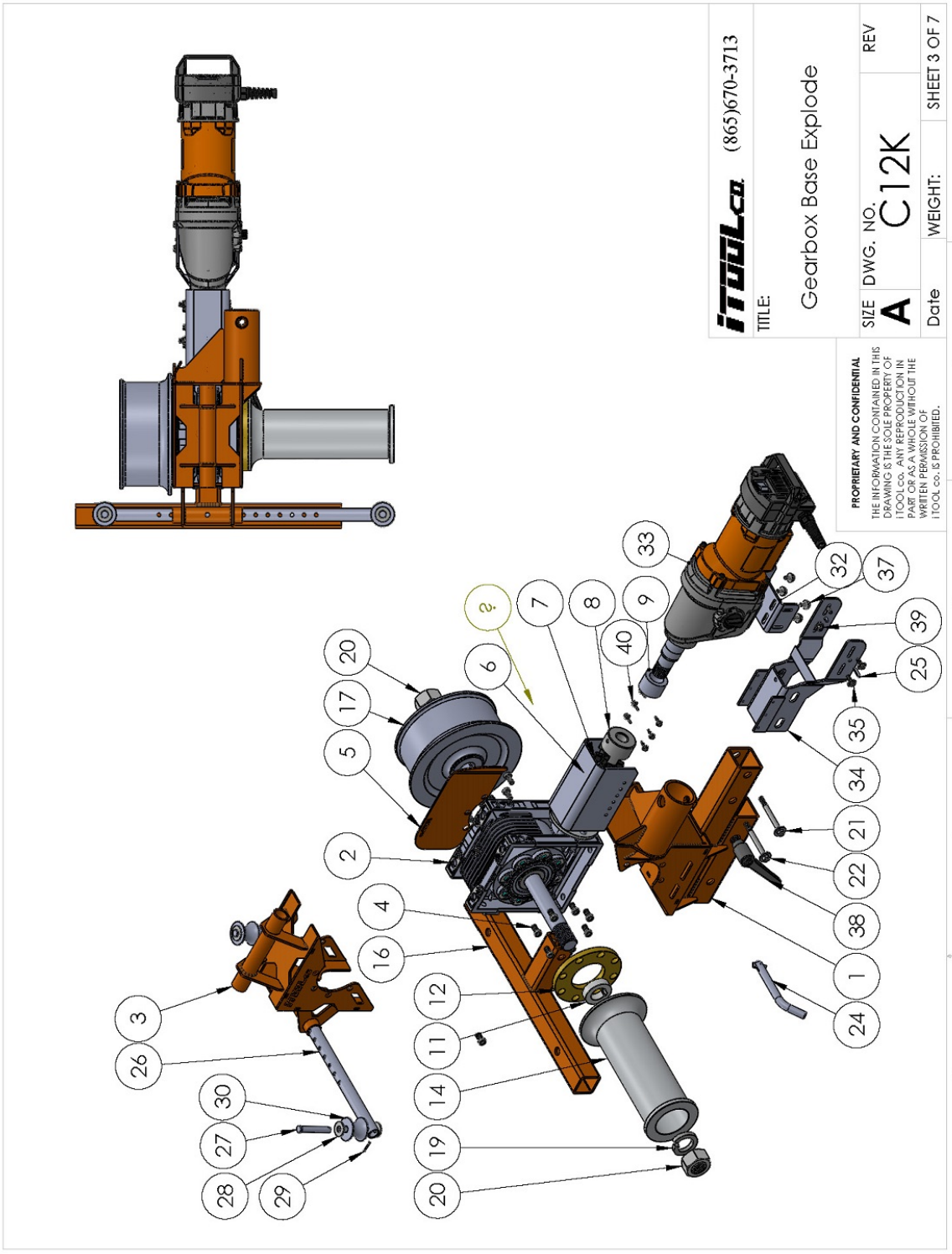
TITLE:

SIZE	DWG. NO.	REV
A	C12K	
Date	WEIGHT:	SHEET 2 OF 7

5 4 3 2 1


iTOOLco (865)670-3713
TITLE:
Gearbox Base Explode
SIZE A
DWG. NO. C12K
REV
Date
WEIGHT:
SHEET 3 OF 7
PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF iTOOL co.. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF iTOOL co. IS PROHIBITED.
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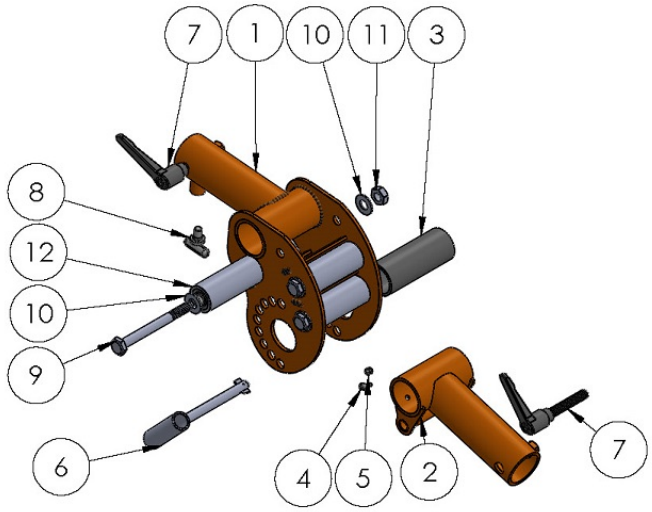
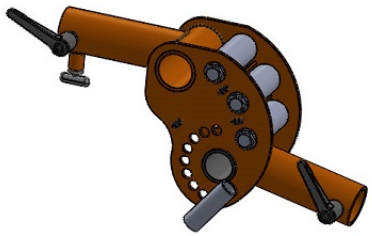
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	C10K-403	Main roller	1
2	C10K-409	Main roller adjustable coupling	1
3	C10K-411	Main rolles sleeve	1
4	HW-120	1/4"-20t x 7/8" hex bolt	1
5	HW-128	1/4 20 Nyloc nut	1
6	SP-182	5/8" Hitch Pin w/ Flashlight Holder	1
7	SP- 123	5/8" x 3"L Adjustable handle	2
8	SP-001.2	Pull Pop Pin	1
9	HW-175	5/8" 11t x 6.5" Bolt	3
10	HW-176	5/8" SAE Washer	6
11	Hw-182	5/8" nyloc nut	3
12	C10K-607	2" Steel Roller (with sleeve bearings)	3





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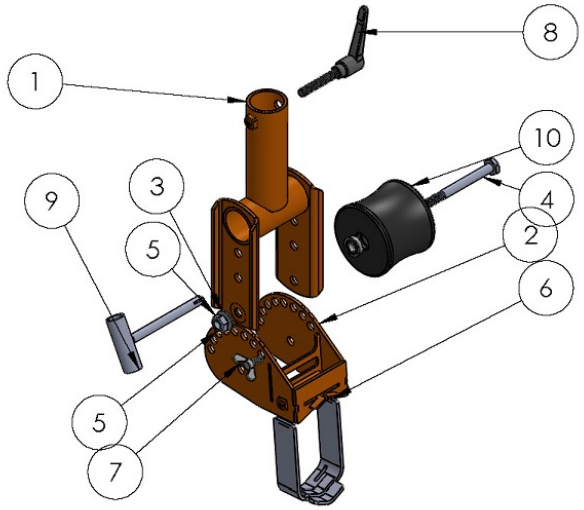
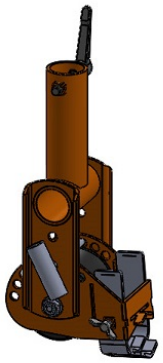
TITLE:

SIZE	DWG. NO.	REV
A	C12K	
Date	WEIGHT:	SHEET 5 OF 7

5 4 3 2 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	C10K-408	Front Knuckle Coupling	1
2	C6K-407.2	Front Knuckle	1
3	HW-176	5/8" SAE Washer	4
4	HW-175	5/8" 11t x 6.5" Bolt	1
5	Hw-182	5/8" nyloc nut	1
6	CK-10	Universal Adapter	1
7	HW-164	1" - 1/2" 13t wing bolt	1
8	SP- 123	5/8" x 3"L Adjustable handle	1
9	HW-265	5/8" Hitch Pin w/ Flashlight Holder	1
10	SP-107	Fron & Main Roller	1
11	SP-114	5/8" ID 1-3/8"OD Bearing	2





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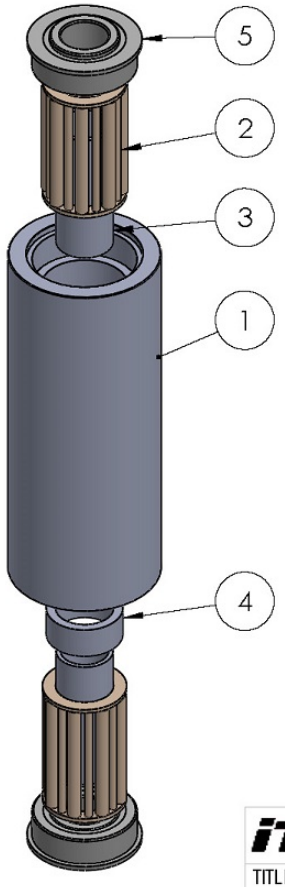
TITLE:

Front Roller Assembly

SIZE	DWG. NO.	REV
A	C12K	
Date	WEIGHT:	SHEET 6 OF 7

5 4 3 2 1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	C10K-441	Main Roller (zinc)	1
2	SP-173	Roller Bearing	2
3	SP-217	Inner Sleeve for Bearing SP-273	2
4	C10K-148	.42" of BM-28	1
5	SP-114	5/8" ID 1-3/8"OD Bearing	2



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TITLE:

SIZE	DWG. NO.	REV
A	C12K	
Date	WEIGHT:	SHEET 7 OF 7

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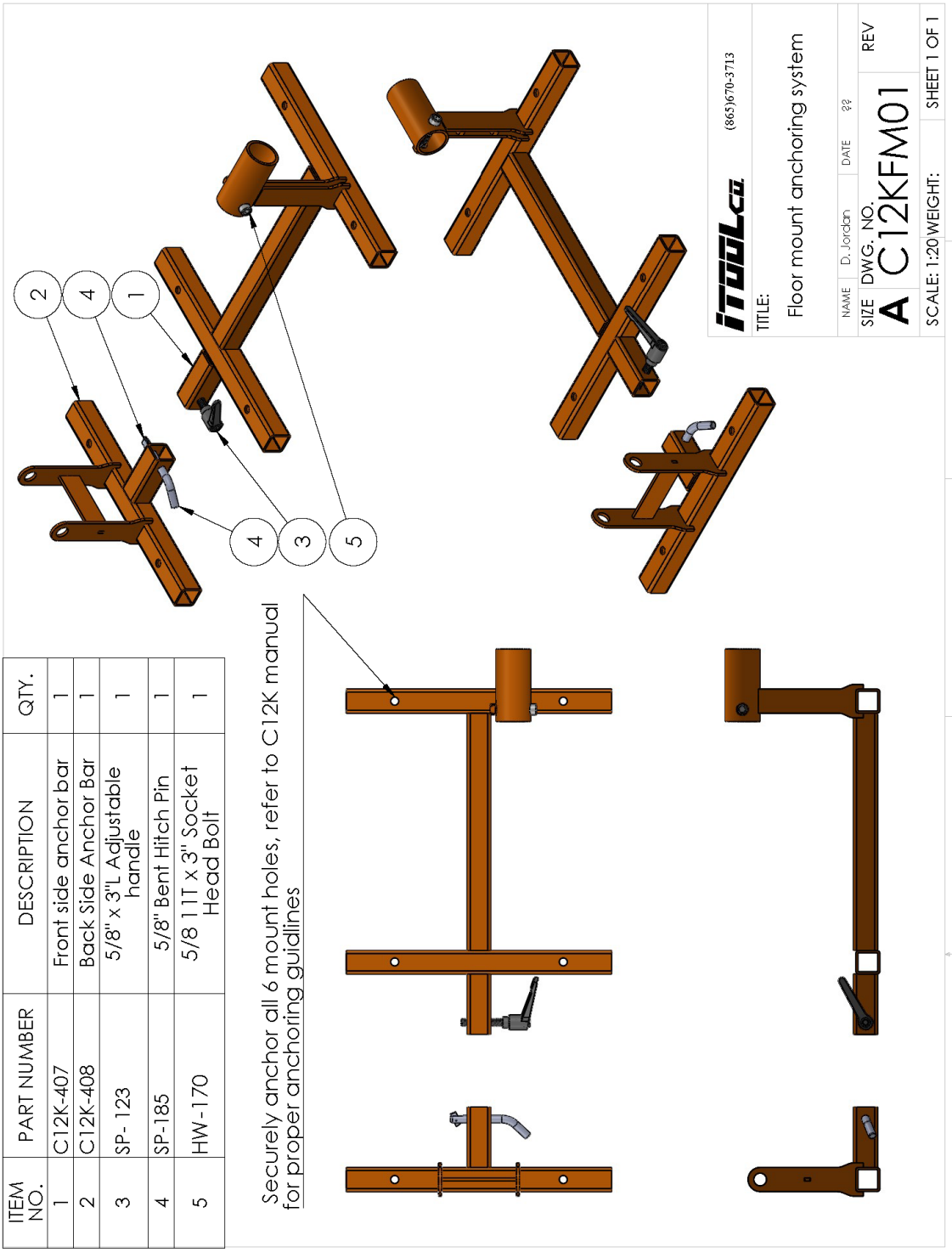
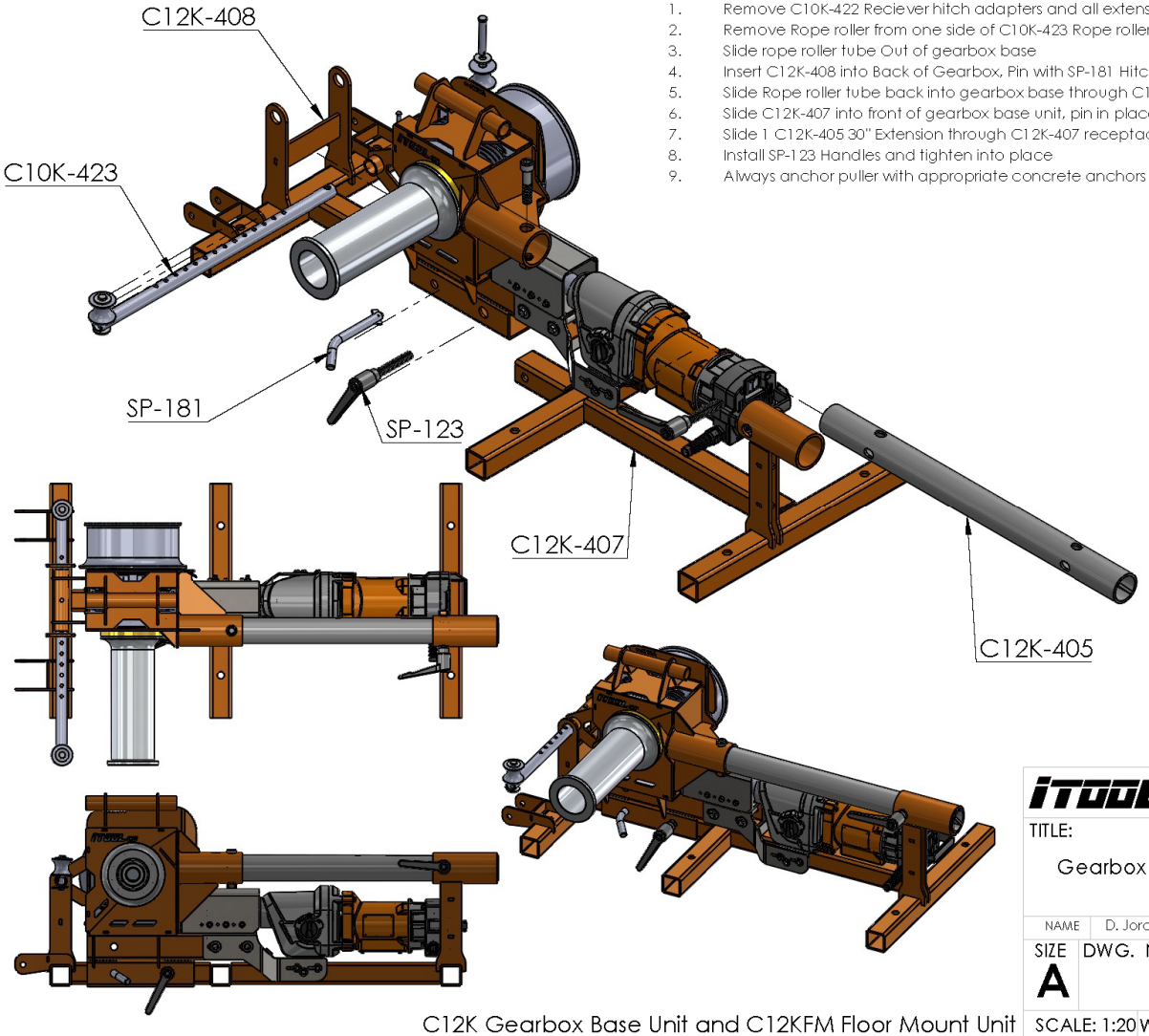
Bolt down frame for loads over 5000 lb. use part # C12KFM01.



To Install C12KFM01 Kit to C12K-606 Gearbox Base unit

1. Remove C10K-422 Reciever hitch adapters and all extensions and rollers
2. Remove Rope roller from one side of C10K-423 Rope roller tube
3. Slide rope roller tube Out of gearbox base
4. Insert C12K-408 into Back of Gearbox, Pin with SP-181 Hitch pin
5. Slide Rope roller tube back into gearbox base through C12K-408
6. Slide C12K-407 into front of gearbox base unit, pin in place with SP-123
7. Slide 1 C12K-405 30" Extension through C12K-407 receptacle and mount into gearbox base
8. Install SP-123 Handles and tighten into place
9. Always anchor puller with appropriate concrete anchors before pulling



C12K Gearbox Base Unit and C12KFM Floor Mount Unit

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TITLE: Gearbox Base unit (see pg. 2)

NAME	D. Jordan	DATE	??

SIZE	DWG. NO.	REV
A		

SCALE: 1:20 WEIGHT: SHEET 1 OF 1

5 4 3 2 1

SET UP AND OPERATION

1. Always wear gloves, eye protection, and appropriate safety gear when working with pullers.
2. Remove iTOOLco Cannon 12K from shipping crate.
3. Insert 5 conduit adapters into base unit.
4. If necessary, install axle and wheels onto base.
5. iTOOLco Cannon 12K is designed to be used with a 20 amp, 6 speed coring motor.
6. Plug in the foot switch to the 100 volt power supply.
7. Set the desired speed.

Gear Setting	Low Speed (small capstan)	High Speed (large capstan)
1	5 feet per minute	12 feet per minute
2	10 feet per minute	24 feet per minute
3	15 feet per minute	36 feet per minute

Attaching Conduit Adapters

Option 1 - Using the universal adapter (Figure 1)

1. Loosen the 1/2” bolt on either side of the front head.
2. Slide the universal adapter in or out to accommodate the appropriate size of conduit, as shown in Figure 3.
3. Make sure that the adapter engages the conduit, as shown in Figure 4.

Note: The universal adapter is to be used for pulling loads under 5,000 lbs. For loads over 5,000 lbs., the conduit adapters provided with your puller should always be utilized.

Option 2 - Using the appropriate 2” – 4” adapter (Figure 2)

1. Place the desired conduit adapter size into the top of the universal adapter. See Figures 5 and 6.
2. Slide the adapters toward the puller until the male pin on the adapter engages the female opening and stops. Tighten the 1/2” bolt on the side of the head body. See Figure 7.
3. Remove the adjustment hitch pin. Slide the puller into position and place the conduit adapter into the conduit. See Figure 8.
4. Replace all hitch pins.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Underground Wire Pull

1. Pivot front extension assembly as needed and reinsert pin.
2. Lift up front end and place conduit adapter into conduit. Always make sure conduit adapter sits flush around the conduit you are pulling through.
3. Replace pin front assembly to lock all parts tight. (This must be pinned for the puller to operate safely and properly.)
4. Make sure side set screw is tight on the universal adapter.
5. Do not stand in-line with the rope being pulled, (stand to the side of the puller) to avoid injury if the rope breaks.
6. Use proper lubricant to make pulling jobs smoother.
7. Determine which capstan you will be using. For lighter loads at high speed, use the large diameter capstan. For heavy loads, use the small diameter capstan. Note: To achieve the optimum pulling speed when making a wire pull, listen to the sound of the motor. If it is determined that the motor is straining, switch to the small diameter capstan.
8. Loosely wrap rope around the appropriate capstan. Start the capstan turning by stepping on the included footswitch. Pull on the rope to produce some tension. The rope will begin to advance. Note: If balling or backlashing occurs, reduce the number or wraps around the capstan.
9. Maintain tension on the rope. The rope will slip on the capstan during normal operation. Keep the rope moving so that the capstan does not contact one spot on the rope for more than a few seconds. If the rope stays in contact with the capstan for more than a few seconds, it will heat up quickly and may break. Do not exceed about 45 N (10 lbs.) of tension on the rope. If the pull becomes difficult, add another wrap or two of rope to the capstan. If excessive force becomes necessary, stop the pull and inspect the set up.



Overhead Wire Pull

1. Convert the Cannon 12K to an overhead configuration by removing the cinch pin at the main knuckle. Pull the snap pin, and rotate the front end right or left to the desired position.
2. To achieve optimum balance, slide base to adjust the front knuckle weight.
3. Adjust front knuckle and main knuckle for proper alignment of the adapter into and onto the conduit.
4. Use the universal adapter if the pull is under 5,000 lbs. If the pull is over 5,000 lbs. attach the correct size adapter and thread the rope through the adapter.
5. Install and tighten all pins.
6. Do not stand in-line with the rope being pulled, (stand to the side of the puller) to avoid injury if the rope breaks. **Note**: Use only low stretch rope designed for wire pulling, 5/8" to 7/8" sizes.
7. Use proper lubricant or no-lube wire to make pulling jobs smoother.
8. Determine which capstan to use. For lighter loads at high speed, use the large diameter capstan. For heavy loads, use the small diameter capstan.
   Note: To achieve optimum pulling speed, listen to the sound of the motor. If the motor is straining, switch to the small diameter capstan.
9. Loosely wrap rope around the appropriate capstan. Step on the included foot switch to start the capstan turning. Pull on the rope to produce some tension. The rope will begin to advance. **Note**: If balling or backlashing occurs, reduce the number of wraps around the capstan
10. Maintain tension on the rope. The rope will slip on the capstan during normal operation. Keep the rope moving so that it does not contact one area of the capstan for more than a few seconds, or it may heat up and break. **Note**: Do not exceed about 45 N (10 lb.) of tension on the rope. If the pull becomes difficult, add another wrap or two of rope to the capstan. If excessive force becomes necessary, stop the pull and inspect the set up.

Pulling Out Extra Wire

1. If extra wire is needed, remove provided extensions from carriage point.
2. Separate the front knuckle from the main knuckle.
3. Place extensions in line.
4. Then slide the extension over the extension tube.

33” and 15” Extensions Store Right on the Cannon 12K

Receiver Hitch Wire Pulls

1. Remove bottom pin from adjustable leg and remove front assembly from gear box section.
2. Remove wheel assembly.
3. Slide receiver hitch into trailer receiver hitch with the capstans horizontal.
4. Secure puller to receiver hitch with hitch pin.

Maintenance

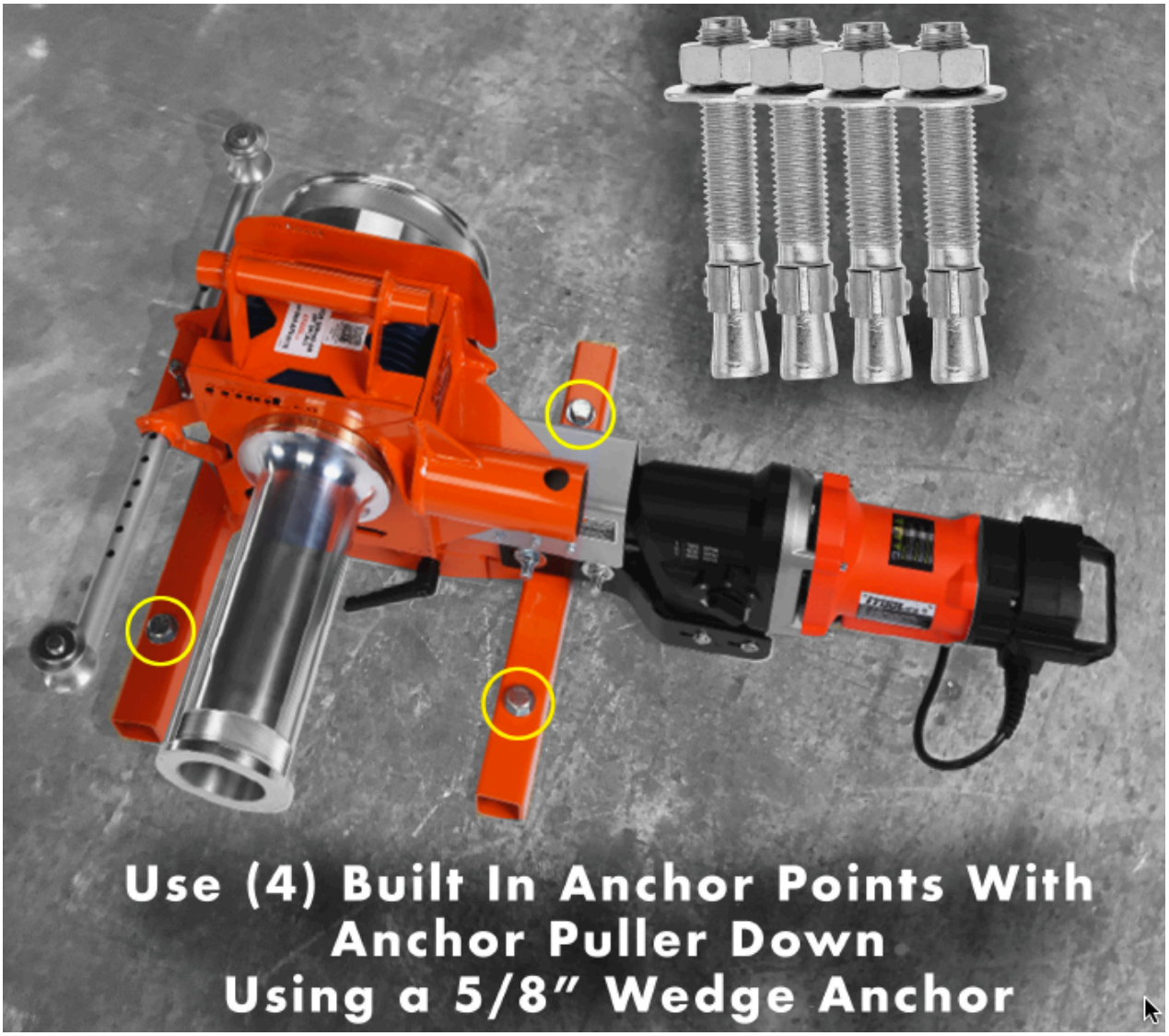
Gear box is filled with high-temperature synthetic gear lubricant. No maintenance is required. Always make sure that Cannon 12K is clean and in good working order before use. Replace any worn rollers or rusty pins before use.

Specifications

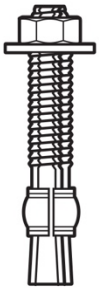
Length (fully extended)	188”
Width	30”
Weight/Mass	404 lb.
Pulling rope minimum average breaking strength	15,000 lbs.
Recommended pulling rope size	5/8” or larger

Patented

Anchoring the Cannon 12K



Trubolt Wedge



SPECIFIED FOR ANCHORAGE INTO CONCRETE

Trubolt Wedge anchors feature a stainless steel expansion clip, threaded stud body, nut and washer. Anchor bodies are made of plated carbon steel, hot-dipped galvanized carbon steel, type 304 stainless steel or type 316 stainless steel as identified in the drawings or other notations.

The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance with ANSI B212.15-1994 to install anchors.

Anchors are tested to ACI 355.2 and ICC-ES AC193. Anchors are listed by the following agencies as required by the local building code: ICC-ES, UL, FM, City of Los Angeles, California State Fire Marshal and Caltrans.

See pages 42-43 for performance values in accordance to 2006 IBC.

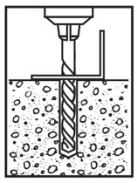
APPROVALS/LISTINGS

Trubolt®
Wedge Anchors

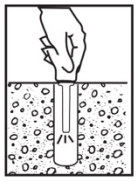
ICC Evaluation Service, Inc. # ESR-2251
- – Category 1 performance rating
- – 2006 IBC compliant
- – Meets ACI 318 ductility requirements
- – Tested in accordance with ACI 355.2 and ICC-ES AC193
- – For use in seismic zones A & B
- – 1/4", 3/8" & 1/2" diameter anchors listed in ESR-2251

Underwriters Laboratories
Factory Mutual
City of Los Angeles - #RR2748
California State Fire Marshall
Caltrans
Meets or exceeds U.S. Government G.S.A. Specification A-A-1923A Type 4 (formerlyGSA: FF-S-325 Group II, Type 4, Class 1)

INSTALLATION STEPS



1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole to any depth exceeding the desired embedment. See chart for minimum recommended embedment.



2. Clean hole or continue drilling additional depth to accommodate drill fines.

3. Assemble washer and nut, leaving nut flush with end of anchor to protect threads. Drive anchor through material to be fastened until washer is flush to surface of material.

4. Expand anchor by tightening nut 3-5 turns past the hand tight position, or to the specified torque requirement.

**** ONLY FOR USE IN CONCRETRE****

LENGTH INDICATION CODE *

CODE	LENGTH OF ANCHOR		CODE	LENGTH OF ANCHOR	
A	1-1/2 < 2	(38.1 < 50.8)	K	6-1/2 < 7	(165.1 < 177.8)
B	2 < 2-1/2	(50.8 < 63.5)	L	7 < 7-1/2	(177.8 < 190.5)
C	2-1/2 < 3	(63.5 < 76.2)	M	7-1/2 < 8	(190.5 < 203.2)
D	3 < 3-1/2	(76.2 < 88.9)	N	8 < 8-1/2	(203.2 < 215.9)
E	3-1/2 < 4	(88.9 < 101.6)	O	8-1/2 < 9	(215.9 < 228.6)
F	4 < 4-1/2	(101.6 < 114.3)	P	9 < 9-1/2	(228.6 < 241.3)
G	4-1/2 < 5	(114.3 < 127.0)	Q	9-1/2 < 10	(241.3 < 254.0)
H	5 < 5-1/2	(127.0 < 139.7)	R	10 < 11	(254.0 < 279.4)
I	5-1/2 < 6	(139.7 < 152.4)	S	11 < 12	(279.4 < 304.8)
J	6 < 6-1/2	(152.4 < 165.1)	T	12 < 13	(304.8 < 330.2)

*Located on top of anchor for easy inspection.

PERFORMANCE TABLE

Trubolt Wedge Anchors — Recommended Edge and Spacing Distance Requirements for Shear Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .60 In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .20 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING BETWEEN ANCHORS In. (mm) LOAD FACTOR APPLIED = .40
1/4 (6.4)	1-1/8 (28.6) 1-15/16 (49.2)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8) 1-15/16 (49.2)	1-5/16 (33.3) 1 (25.4)	N/A N/A	3-15/16 (100.0) 3-7/8 (98.4)	2 (50.8) 1-15/16 (49.2)
3/8 (9.5)	1-1/2 (38.1) 3 (76.2)		2-5/8 (66.7) 3-3/4 (95.3)	1-3/4 (44.5) 3 (76.2)	N/A 1-1/2 (38.1)	5-1/4 (133.4) 6 (152.4)	2-5/8 (66.7) 3 (76.2)
1/2 (12.7)	2-1/4 (57.2) 4-1/8 (104.8)		3-15/16 (100.0) 5-3/16 (131.8)	2-9/16 (65.1) 3-1/8 (79.4)	N/A 1-9/16 (39.7)	7-7/8 (200.0) 6-3/16 (157.2)	3-15/16 (100.0) 3-1/8 (79.4)
5/8 (15.9)	2-3/4 (69.9) 5-1/8 (130.2)		4-13/16 (122.2) 6-7/16 (163.5)	3-1/8 (79.4) 3-7/8 (98.4)	N/A 1-15/16 (49.2)	9-5/8 (244.5) 7-11/16 (195.3)	4-13/16 (122.2) 3-7/8 (98.4)
3/4 (19.1)	3-1/4 (82.6) 6-5/8 (168.3)		5-11/16 (144.5) 6-5/16 (160.3)	3-3/4 (95.3) 5 (127.0)	N/A 2-1/2 (63.5)	11-3/8 (288.9) 9-15/16 (252.4)	5-11/16 (144.5) 5 (127.0)
7/8 (22.2)	3-3/4 (95.3) 6-1/4 (158.8)		6-9/16 (166.7) 8-1/2 (215.9)	4-5/16 (109.5) 6-1/4 (158.8)	N/A 3-1/8 (79.4)	13-1/8 (333.4) 12-1/2 (317.5)	6-9/16 (166.7) 6-1/4 (158.8)
1 (25.4)	4-1/4 (108.0) 7-3/8 (187.3)		7-7/8 (200.0) 10-1/16 (255.6)	5-1/8 (130.2) 7-3/8 (187.3)	N/A 3-11/16 (93.7)	15-3/4 (400.1) 14-3/4 (374.7)	7-7/8 (200.0) 7-3/8 (187.3)

*Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

PERFORMANCE TABLE

Trubolt Wedge Anchors — Recommended Edge and Spacing Distance Requirements for Tension Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .65 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING AT WHICH THE LOAD FACTOR APPLIED = .70 In. (mm)
1/4 (6.4)	1-1/8 (28.6) 1-15/16 (49.2) 2-1/8 (54.0)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8) 1-15/16 (49.2) 1-5/8 (41.3)	1 (25.4) 1 (25.4) 13/16 (20.6)	3-15/16 (100.0) 3-7/8 (98.4) 3-3/16 (81.0)	2 (50.8) 1-15/16 (49.2) 1-5/8 (41.3)
3/8 (9.5)	1-1/2 (38.1) 3 (76.2) 4 (101.6)		2-5/8 (66.7) 3 (76.2) 3 (76.2)	1-5/16 (33.3) 1-1/2 (38.1) 1-1/2 (38.1)	5-1/4 (133.4) 6 (152.4) 6 (152.4)	2-5/8 (66.7) 3 (76.2) 3 (76.2)
1/2 (12.7)	2-1/4 (57.2) 4-1/8 (104.8) 6 (152.4)		3-15/16 (100.0) 3-1/8 (79.4) 4-1/2 (114.3)	2 (50.8) 1-9/16 (39.7) 2-1/4 (57.2)	7-7/8 (200.0) 6-3/16 (157.2) 9 (228.6)	3-15/16 (100.0) 3-1/8 (79.4) 4-1/2 (114.3)
5/8 (15.9)	2-3/4 (69.9) 5-1/8 (130.2) 7-1/2 (190.5)		4-13/16 (122.2) 3-7/8 (98.4) 5-5/8 (142.9)	2-7/16 (61.9) 1-15/16 (49.2) 2-13/16 (71.4)	9-5/8 (244.5) 7-1/16 (195.3) 11-1/4 (285.8)	4-13/16 (122.2) 3-7/8 (98.4) 5-5/8 (142.9)
3/4 (19.1)	3-1/4 (82.6) 6-5/8 (168.3) 10 (254.0)		5-11/16 (144.5) 5 (127.0) 7-1/2 (190.5)	2-7/8 (73.0) 2-1/2 (63.5) 3-3/4 (95.3)	11-3/8 (288.9) 9-15/16 (252.4) 15 (381.0)	5-11/16 (144.5) 5 (127.0) 7-1/2 (190.5)
7/8 (22.2)	3-3/4 (95.3) 6-1/4 (158.8) 8 (203.2)		6-9/16 (166.7) 6-1/4 (158.8) 6 (152.4)	3-5/16 (84.1) 3-1/8 (79.4) 3 (76.2)	13-1/8 (333.4) 12-1/2 (317.5) 12 (304.8)	6-9/16 (166.7) 6-1/4 (158.8) 6 (152.4)
1 (25.4)	4-1/2 (114.3) 7-3/8 (187.3) 9-1/2 (241.3)		7-7/8 (200.0) 7-3/8 (187.3) 7-1/8 (181.0)	3-15/16 (100.0) 3-11/16 (93.7) 3-9/16 (90.5)	15-3/4 (400.1) 14-3/4 (374.7) 14-1/4 (362.0)	7-7/8 (200.0) 7-3/8 (187.3) 7-1/8 (181.0)

*Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

Combined Tension and Shear Loading—for Trubolt Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(Ps/Pt)^{5/3} + (Vs/Vt)^{5/3} \leq 1$$

Ps = Applied tension load Vs = Applied shear load Pt = Allowable tension load Vt = Allowable shear load

Trubolt Strength Design Performance values in accordance to 2006 IBC

ITW RED HEAD TRUBOLT WEDGE ANCHOR

DESIGN INFORMATION TESTED TO ICC-ES AC193 AND ACI 355.2, IN ACCORDANCE WITH 2006 IBC

Trubolt® Wedge Anchors

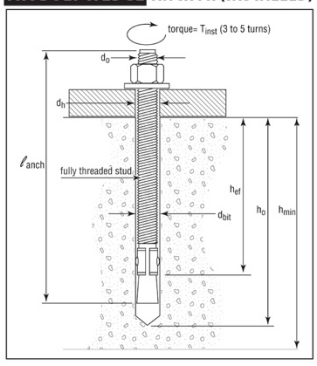
TRUBOLT WEDGE ANCHOR DESIGN INFORMATION[1,2,3]

DESIGN INFORMATION	Symbol	Units	Nominal Anchor Diameter									
			1/4		3/8		1/2		5/8		3/4	
Anchor O.D.	d_o	in	0.250		0.375		0.500		0.625		0.750	
Effective embedment	h_{ef}	in	1-1/2	2	1-3/4	2-5/8	1-7/8	3-3/8	3-1/2	4	3-1/2	4-3/4
Minimum member thickness	h_{min}	in	4	4	4	5	5	6	5	8	6	8
Critical edge distance	c_{ac}	in	2-5/8	3	2-5/8	5-1/4	3-3/4	6-3/4	5	8	7	9
Minimum edge distance	c_{min}	in	1-3/4	1-1/2	2-1/4	2	3-3/4	3-3/4	4-1/4	3-1/4	3-3/4	3-1/2
Minimum anchor spacing	s_{min}	in	1-3/4	1-1/2	2-1/4	2	3-3/4	3-3/4	4-1/4	3-1/4	3-3/4	3-1/2
Min. Specified Yield Strength	f_y	lb/in²	55,000									
Min. Specified Ultimate Strength	f_{uta}	lb/in²	75,000									
Effective tensile stress area	A_{se}	in²	0.032		0.078		0.142		0.226		0.334	
Steel strength in tension	N_s	lb	2,385		5,815		10,645		16,950		25,050	
Steel strength in shear	V_s	lb	1,430		2,975	3,490	4,450	6,385	6,045	10,170	10,990	15,030
Pullout strength, uncracked concrete	$N_{p,uncr}$	lb	1,392	1,706	2,198	3,469	2,400	4,168	4,155	6,638	8,031	10,561
Anchor Category (All anchors are ductile)			1									
Effectiveness factor k_{uncr} uncracked concrete			24									
Axial stiffness in service load range	β	lb/in	14,651	9,385	17,515	26,424	32,483	26,136	42,899	21,749	43,576	28,697
Coefficient for variation for axial stiffness in service load range			34	47	28	45	17	33	55	22	63	28
Strength reduction factor ϕ for tension, steel failure modes			0.75									
Strength reduction factor ϕ for shear, steel failure modes			0.65									
Strength reduction factor ϕ for tension, concrete failure modes, Condition B			0.65									
Strength reduction factor ϕ for shear, concrete failure modes, Condition B			0.70									

[1] Trubolt+ Anchor Design Strengths must be determined in accordance with ACI 318-05 Appendix D and this table
[2] The Trubolt+ Wedge Anchor is a ductile steel element as defined by ACI 318 D.1
[3] 1/4", 3/8", & 1/2" diameter data is listed in ICC-ES ESR-2251.

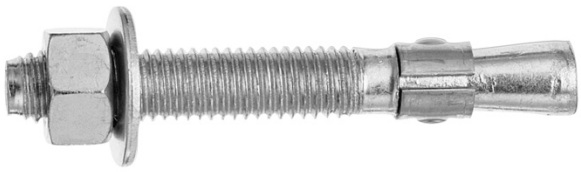
Trubolt® Wedge Anchors

TRUBOLT WEDGE ANCHOR (INSTALLED)



TRUBOLT WEDGE INSTALLATION INFORMATION

	Symbol	Units	Nominal Anchor Diameter (in.)									
			1/4		3/8		1/2		5/8		3/4	
Anchor outer diameter	d_o	in	0.25		0.375		0.5		0.625		0.750	
Nominal carbide bit diameter	d_{bit}	in	1/4		3/8		1/2		5/8		3/4	
Effective embedment depth	h_{ef}	in	1-1/2	2	1-3/4	2-5/8	1-7/8	3-3/8	2-1/2	4	3-1/2	4-3/4
Min hole depth	h_o	in	2	2-1/2	2-1/2	3-3/8	2-3/4	4-1/4	3-3/4	5-1/4	4-3/4	6
Min slab thickness	h_{min}	in	4		4	5	5	6	5	8	6	8
Installation torque	T_{inst}	ft-lb	4		25		55		90		110	
Min hole diameter in fixture	d_h	in	5/16		7/16		9/16		11/16		13/16	



PERFORMANCE TABLE

Trubolt Wedge Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	f'c = 2000 PSI (13.8 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 6000 PSI (41.4 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	4 (5.4)	1-1/8 (28.6)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,180 (5.2)	1,400 (6.2)	1,780 (7.9)	1,400 (6.2)	1,900 (8.5)	1,400 (6.2)
		1-15/16 (49.2)		2,100 (9.3)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
		2-1/8 (54.0)		2,260 (10.1)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)		1,680 (7.5)	2,320 (10.3)	2,240 (10.0)	2,620 (11.7)	2,840 (12.6)	3,160 (14.1)
		3 (76.2)		3,480 (15.5)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
		4 (101.6)		4,800 (21.4)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		4,660 (20.7)	4,760 (21.2)	5,100 (22.7)	4,760 (21.2)	7,040 (31.3)	7,040 (31.3)
		4-1/8 (104.8)		4,660 (20.7)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
		6 (152.4)		5,340 (23.8)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
5/8 (15.9)	90 (122.0)	2-3/4 (69.9)		6,580 (29.3)	7,120 (31.7)	7,180 (31.9)	7,120 (31.7)	9,720 (43.2)	9,616 (42.8
		5-1/8 (130.2)		6,580 (29.3)	9,600 (42.7)	14,920 (66.4)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
		7-1/2 (190.5)		7,060 (31.4)	9,600 (42.7)	15,020 (66.8)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
3/4 (19.1)	110 (149.2)	3-1/4 (82.6)		7,120 (31.7)	10,120 (45.0)	10,840 (48.2)	13,720 (61.0)	13,300 (59.2)	15,980 (71.1)
		6-5/8 (168.3)		10,980 (48.8)	20,320 (90.4)	17,700 (78.7)	23,740 (105.6)	20,260 (90.1)	23,740 (105.6)
		10 (254.0)		10,980 (48.8)	20,320 (90.4)	17,880 (79.5)	23,740 (105.6)	23,580 (104.9)	23,740 (105.6)
7/8 (22.2)	250 (339.0)	3-3/4 (95.3)		9,520 (42.3)	13,160 (58.5)	14,740 (65.6)	16,580 (73.8)	17,420 (77.5)	19,160 (85.2)
		6-1/4 (158.8)		14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)
		8 (203.2)		14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)
1 (25.4)	300 (406.7)	4-1/2 (114.3)		13,940 (62.0)	16,080 (71.5)	20,180 (89.8)	22,820 (101.5)	21,180 (94.2)	24,480 (108.9)
		7-3/8 (187.3)		14,600 (64.9)	28,680 (127.6)	23,980 (106.7)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)
		9-1/2 (241.3)		18,700 (83.2)	28,680 (127.6)	26,540 (118.1)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)

*Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

* For Tie-Wire Wedge Anchor, TW-1400, use tension data from 1/4" diameter with 1-1/8" embedment.

*For continuous extreme low temperature applications, use stainless steel.

PERFORMANCE TABLE

Trubolt Wedge Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Lightweight Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	LIGHTWEIGHT CONCRETE f'c = 3000 PSI (20.7 MPa)		LOWER FLUTE OF STEEL DECK WITH LIGHTWEIGHT CONCRETE FILL f'c = 3000 PSI (20.7 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,175 (5.2)	1,480 (6.6)	1,900 (8.5)	3,160 (14.1)
		3 (76.2)		2,825 (12.6)	2,440 (10.9)	2,840 (12.6)	4,000 (17.8)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		2,925 (13.0)	2,855 (12.7)	3,400 (15.1)	5,380 (23.9)
		3 (76.2)		3,470 (15.4)	3,450 (15.3)	4,480 (19.9)	6,620 (29.4)
		4 (101.6)		4,290 (19.1)	3,450 (15.3)	4,800 (21.4)	6,440 (28.6)
5/8 (15.9)	90 (122.0)	3 (76.2)		4,375 (19.5)	4,360 (19.4)	4,720 (21.0)	5,500 (24.5)
		5 (127.0)		6,350 (28.2)	6,335 (28.2)	6,580 (29.3)	9,140 (40.7)
3/4 (19.1)	110 (149.2)	3-1/4 (82.6)		5,390 (24.0)	7,150 (31.8)	5,840 (26.0)	8,880 (39.5)
		5-1/4 (133.4)		7,295 (32.5)	10,750 (47.8)	7,040 (31.3)	N/A

*Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

LIMITED WARRANTY: ITOOLCO CANNON 12K

iTOOLco warrants all new Cannon 12K covered by his agreement, when properly used, to be free from defects in material and workmanship under normal use and service for which it is intended for a period of one year from date of delivery by the dealer. Date of delivery shall be the date product is placed in possession of the user. NORMAL WEAR FROM USE IS NOT PART OF THIS WARRANTY. This limited warranty is extended to the original user only and is not transferrable to, nor enforceable by any other person.

iTOOLco will replace free of charge any part(s) of the product found to be defective when such part(s) is returned to iTOOLco at the address shown below, freight prepaid. If the part(s) if found to be defective, iTOOLco will refund freight charges paid by you in retuning the defective part(s) and prepay replacement part(s) freight charges. iTOOLco will not be responsible for more than replacement of any defective part(s) and standard freight charges (parcel post or UPS ground rate) of any part(s) found to be defective.

THIS IS THE EXCLUSIVE REMEDY. ITOOLCO SHALL NOT BE RESPONSIBLE OR LIABLE FOR ANY INCIDENTAL OR CONSEUQNTIAL DAMAGES RESULTING FROM ANY DEFECTS COVERED BY THIS WARRANTY OR ANY IMPLIED WARRANTY APPLICABLE TO THE PRODUCT INCLUDING, BUT NOT LIMITED TO, PROPERTY DAMAGE, LOSS OF USE OF PRODUCT, LOSS OF TIME, LOSS OF PROFITS, INCONVENIENCE, COMMERCIAL LOSS, LABOR COSTS, SERVICE TRIPS, AND MILEAGE.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

Dealer/Distributor Warranty Claim Procedure

1. All warranty claims must be pre-approved by iTOOLco Warranty Department PRIOR to starting any warranty work. Warranty work performed without prior approval will not be considered.
2. All claims must be handled through dealer/distributor.
3. Written approval must be received from iTOOLco before return of merchandise. A Return Authorization is to be returned with the merchandise which is sent back.
4. All parts must be returned to iTOOLco at the address shown below, freight prepaid.
5. The serial number of the product and the date of delivery must accompany the part(s) being returned.
6. If the part(s) is found to have failed because of a defect in material or workmanship, replacement will be made on a no-charge basis, and the part(s) returned, freight prepaid. Standard freight charges (parcel post or UPS ground rate) incurred in returning the part(s) will be refunded.
7. For reasons of expediency, replacement and/or repair part(s) may be shipped as soon as possible and billed to the dealer/distributor. When part(s) is returned, if it is covered under warrant, credit will be issued for the part(s) and freight charges.
8. All parts found to be defective shall be retained by and shall become the property of iTOOLco. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Corporate Address: iTOOLco
100 Meco Lane
Oak Ridge, TN 37830

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