Hart Engineering Corporation

SUBMITTAL:
11200-02

PROJECT: 9900. - Veolia/Taunton WWTF Phase 1 Improvements **DATE: 04/10/2022**

SUBMITTAL: 11200-02 - Lever Operated Skimmer O&M Manual
REVISION: 0
STATUS: Eng
SPEC #: 11200

TO:
Michael Andrus
Beta Group Inc.
6 Blackstone Place
Lincoln, RI 02865
MAndrus@BETA-Inc.com

FROM:
Ryan Murphy
Hart Engineering Corporation
800 Scenic View Drive
Cumberland, RI 02864
rmurphy@hartcompanies.com

Item	Revision	Description	Status	Date Sent	Date Returned
11200-02	0	Lever Operated Skimmer O&M Manual	Eng	04/10/2022	
Notes:					

Additional Notes:

Status Codes
1-APP – No Exceptions Taken
2-ANR – Make Corrections Noted
3-R&R – Revise and Resubmit
4-REJ – Rejected
5-IPO – For Information Purposes Only
6-NRR – Not Required for Review
ENG – Submitted to Engineer

Sincerely,
Hart Engineering Corporation

_____ DATE: 04/10/2022

AMWELL®
A DIVISION OF McNISH CORPORATION

161 S. LINCOLNWAY STREET, STE 310
NORTH AURORA, ILLINOIS 60542
PHONE (630) 898-6900
E-MAIL amwell@amwell-inc.com

April 8, 2022

VIA E-mail: rmurphy@hartcompanies.com
jdeluca@aquasolutionsinc.net

Hart Engineering Corporation
800 Scenic View Drive
Cumberland, RI 02864

Attention: Ryan Murphy

Subject: Taunton, Massachusetts
Waste Water Treatment Plant Phase 1
P.O. No.: 9900.105 & Dated 9/18/2021
Spec. Section 11200 – Lever Operated Skimmer
Model "PSL" Pipe Skimmers
AMWELL S.O. A22140-12
Installation, Operation and Maintenance Manual

Dear Mr. Murphy:

We are pleased to submit a PDF copy of the Installation, Operation and Maintenance Manual for the Model "PSL" Pipe Skimmer equipment we are furnishing on the subject project.

Feel free to call if you have any questions or if we can be of any further assistance.

Sincerely,

AMWELL®
A Division of McNish Corporation

Arthur L. Benner
Engineering Manager

cc: ALB/File

ALB/jlb

AMWELL®
Aurora, Illinois

TAUNTON, MASSACHUSETTS

WASTEWATER TREATMENT PLANT – PHASE 1
SPEC. SECTION 11200 – LEVER OPERATED SKIMMER
MODEL “PSL” PIPE SKIMMERS

AMWELL S.O. A22140-12

AMWELL®
A DIVISION OF McNISH CORPORATION

161 S. LINCOLNWAY ST., STE. 310
NORTH AURORA, IL 60542
PHONE (630) 898-6900
FAX (630) 898-6901
E-MAIL amwell@amwell-inc.com

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

PROJECT ..... WASTE WATER TREATMENT PLANT – PHASE 1
TAUNTON, MASSACHUSETTS

ENGINEER ..... BETA ENGINEERING

CUSTOMER/CONTRACTOR ..... HART ENGINEERING CORPORATION
800 SCENIC VIEW DRIVE
CUMBERLAND, RI 02864

CONTACT: RYAN MURPHY
PHONE: (774) 218-6296

P.O. NO.: 9900.105 & DATED 9/28/2021

AREA REPRESENTATIVE ..... AQUA SOLUTIONS, INC.
154 WEST GROVE STREET, UNIT D
MIDDLEBORO, MA 02346

CONTACT: JIM DELUCA
PHONE: (508) 947-5777
FAX: (508) 861-0733

SPECIFICATION REFERENCE ..... SECTION 11200 – LEVER OPERATED SKIMMER

AMWELL IDENTIFICATION NO. ..... S.O. A22140-12 – TWO (2) MODEL “PSL” PIPE SKIMMER MECHANISMS

SUBMITTED ..... APRIL 8, 2022

TABLE OF CONTENTS

SECTION A

GENERAL INFORMATION

ALL EQUIPMENT

PARTS SUPPLIER

If a problem is encountered in installing or operating the equipment which cannot be solved by referring to the available material, please contact:

AMWELL
A Division of McNish Corporation
161 S. Lincolnway St., Suite 310
North Aurora, Illinois 60542

Phone: (630) 898-6900
Fax: (630) 898-6901

Attention: Customer Service Department

PROCESS EQUIPMENT

GENERAL INFORMATION

All instructions are written as an aid to the erector and user. It is important to thoroughly read and study these instructions before erecting or operating the equipment. A few minutes spent reading these instructions might save unnecessary hours of re-doing some part of the erection of this equipment.

The procedures outlined are recommended by AMWELL and are a compilation of many years of experience. Should additional information not contained in this manual be needed, do not hesitate to contact our offices.

PROCESS EQUIPMENT

SPECIAL INSTRUCTIONS TO EQUIPMENT ERECTORS

A. RECEIVING SHIPMENT

All material has been thoroughly checked and inspected prior to shipment. We have taken precautions to protect the equipment against damage or losses during shipment. If the equipment is received in bad condition or the number of pieces are not as listed on the bill-of-lading or attached packing list, make sure you note this on the bill-of-lading and have the driver sign and acknowledge same. This enables you to place the proper claims against the freight company.

It is also strongly recommended that you give the itemized packing list to one person and have them verify upon receipt that all nuts, bolts, washers, etc. are received. This person should be held responsible for their storage and distribution as needed.

B. STORAGE

Proper storage of the equipment before and during installation is the responsibility of the erector. Specific storage instructions are covered elsewhere.

C. INSTRUCTIONS

Drawings and erection or installation instructions must be followed to assure proper sequences. In case of minor discrepancies, the drawings should govern. In the event of major discrepancies, notify **AMWELL** immediately.

D. FIELD INSTALLATION

As we do not anticipate problems with the installation of our equipment we assume the erector will follow the guidelines of the AISC "Code of Standard Practice". Specifically, Section 5-7.12. Because of the nature of an engineered fabricated product, a certain amount of fit-up and adapting must be done by the erector and is considered a normal part of installation, as well as any special tools needed for installation.

E. FIELD CHARGES

If problems occur because of fabrication or engineering errors, **AMWELL** will accept backcharges only if they are authorized in advance and in writing by **AMWELL.** Before work is started the erector must obtain a **AMWELL** field work order which must include a cost limitation. Authorized charges will be paid on the basis of standard direct field labor hours and materials only. Profit, overhead and all other charges will not be allowed.

ANY BACKCHARGE SUBMITTED CONTRARY TO THIS AGREEMENT WILL BE REJECTED IN TOTAL WITHOUT CONSIDERATION.

PROCESS EQUIPMENT

STORAGE INSTRUCTIONS & PROTECTIVE PRECAUTIONS

If materials and equipment are to be stored or not used for 30 days, precautions should be taken to protect against corrosion and assure operating condition.

LONG TERM STORAGE - STRUCTURAL STEEL

Inspect painted surfaces for deterioration of primer paint. Remove corrosion and rust. Re-paint as necessary with identical type of primer. Shop primed surfaces should be finish-coated within the time specified by the paint manufacturer. When in doubt apply finish coats as soon as possible.

AMWELL cannot accept responsibility for shop primer coats that have deteriorated due to exposure and time.

SHOP PRIMER DURABILITY - STRUCTURAL STEEL

Shop primer paints are to serve as a minimal protective finish. **AMWELL** will not be responsible for condition of primed or finished painted surfaces after the equipment leaves its shop. Purchasers are invited to inspect painting in our shops for proper preparation and application prior to shipment. **AMWELL** assumes no responsibility for field surface preparation or touch-up of shipping damage to paint. Painting of fasteners and other touch-up to painted surfaces to be by purchaser's painting contractor after mechanism erection.

IMPORTANT NOTE: If, for any reason, **AMWELL'S** paint job is rejected after installation, **AMWELL** will bear no costs associated with the removal or installation of the equipment to make modifications.

PROCESS EQUIPMENT

HAZARDOUS MATERIAL WARNING

Effective May 25, 2015, the Federal Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CRF 1910, 1200) requires all manufacturers and importers of hazardous chemicals to provide Safety Data Sheets (SDS) to all customers with initial shipment. Steel products, as supplied by **AMWELL**, in their usual physical form do not pose any health hazards. However, when subject to processing such as welding, burning, grinding, cutting, abrasive blasting, heat treatment, pickling or similar operations potentially hazardous fumes or dust may be emitted. Prolonged, repeated exposure to these processes may cause adverse health effects. When performing any processing, precautions should be taken including use of a dust-fume respirator and eye protection. Gloves are recommended for abrasion.

If you have any questions concerning the content of this letter, please contact us at any time.

PROCESS EQUIPMENT

TO ORDER SPARE OR REPAIR PARTS

To assure the correct parts are received it is most important that the following information is included in your correspondence.

A. SERIAL NUMBER

The serial number is also referred to as the “Contract No.” or contract number. This is a 5 or 6 digit number which appears on the equipment nameplate and all related written correspondence to this order. If this cannot be found, we will need to know the site location (project name), approximate years the equipment has been installed or the type of equipment for which parts are needed.

B. PART NUMBERS

Show the part name and number if at all possible. If taken from a drawing, include drawing number.

C. SIZES

Include sizes, if available, such as shaft lengths, diameters, thickness, etc.

D. MODIFIED EQUIPMENT

If the equipment has been modified or altered, please notify us as to what extent. We can only replace parts which were originally manufactured and supplied by **AMWELL.** We cannot accept responsibility if parts do not fit because of altered equipment.

E. ADDRESSES

Include "bill to" and "ship to" addresses. Also include a phone number and person to contact should further information be needed.

PROCESS EQUIPMENT

TO ORDER SPARE OR REPAIR PARTS

F. REQUEST FOR QUOTATION

As the majority of equipment are engineered products, please contact us with all pertinent information for current pricing and availability.

Send your inquiries and purchase order to:

AMWELL
161 S. LINCOLNWAY ST., SUITE 310
NORTH AURORA, ILLINOIS 60542

PHONE: (630) 264-3900

ATTENTION: PARTS DEPARTMENT

Your equipment is identified as follows:
Please include this number on all correspondence.

SERIAL NUMBER	TYPE OF EQUIPMENT
A22140-12	Two (2) Model “PSG” Pipe Skimmers
	Refer To Section “E” for Ordering Spare Parts

PROCESS EQUIPMENT

GENERAL INFORMATION

BACKCHARGES

AMWELL, A Division of McNish Corporation reserves the right to replace or repair in any manner or by any means, any part proven to be defective in material or workmanship provided buyer given prompt written notice of each defect to **AMWELL.**

If any equipment is received in bad or damaged condition or if any packages are broken, make a bad order notation to this effect on the shipping papers. This will enable you to place the proper claims against the carrier. Please notify **AMWELL** immediately, in writing, if any parts are found damaged or broken during shipment.

Correction of minor misfits such as hole misalignment that can be corrected in the field by reaming, cutting or trimming and any fit up as is customarily done in the field is considered a legitimate part of installation and charges therefore, will not be honored by **AMWELL.**

Any major discrepancies in fabrication or fit up that could affect the structural integrity of the equipment or prevent proper assembly must be reported immediately and in writing to **AMWELL.** AMWELL will not honor any invoice for corrective work performed by the buyer unless prior written approval has been obtained from **AMWELL**, before commencement of any work by the buyer. Such approval shall contain a description of the nature and extent of the work to be performed and a firm fixed price based upon a written quotation from the buyer. Invoices that exceed the price authorized will not be honored.

NO BACKCHARGES WILL BE ACCEPTED WITHOUT PRIOR WRITTEN APPROVAL BY **AMWELL.**

PROCESS EQUIPMENT

GENERAL INFORMATION

WARRANTY POLICY

All equipment furnished by **AMWELL**, A Division of McNish Corporation is warranted to be free from defects in material and workmanship.

Items not manufactured by **AMWELL** are warranted or guaranteed to the extent of the manufacturer's warranty.

All storage, assembly and/or installation must be followed explicitly as stated in this manual.

Removal of condensation and lubrication of gear boxes must be as prescribed in this manual.

Prior to being placed in operation, all equipment supplied by **AMWELL** must be inspected and certified to be in proper operational order. This must be done by an Authorized Field Service Representative of **AMWELL** after all equipment is completely installed.

Before the inspection can be done, all drive units must be operational with full permanent electrical power and all overload switches must be wired and functional.

The inspection will be limited to reasonably accessible items and does not relieve the installer's responsibility for proper assembly and adjustment.

Unless otherwise specifically authorized in writing, any deviations from the instructions given in this manual and/or operation of the equipment prior to inspection and certification by a Representative of **AMWELL** will render all equipment warranties, both specific and implied, null and void.

PROCESS EQUIPMENT

GENERAL INFORMATION

FIELD SERVICE

The erection aids material provided by **AMWELL** should enable you to install, operate and maintain the equipment. This instruction is provided to help you to help yourself and therefore to save you time and expense. If a problem is encountered in installing or operating the equipment which cannot be solved by referring to the available material, please feel free to contact us. Address your inquiry to our **Project Management Department, AMWELL, A Division of McNish Corporation, 161 S. Lincolnway, Suite 310, North Aurora, IL 60542, or call us at (630) 898-6900.**

SECTION B

INSTALLATION, OPERATING, MAINTENANCE & LUBRICATION INSTRUCTIONS

PARTS LIST

IOM PARTS LIST	Contract: A22140 Job Name: TAUNTON, MA WWTP - PHASE 1			
A12000 (2) PIPE SKIMMERS-PSL				
Total Ship Pcs	Mark	Description	Weight /EA	Material
PIPE SKIMMERS-PSL				
2		PIPE		
SKIMMER ASSEMBLY				
2	01	SKIMMER PIPE	334	316
4	02	WALL BEARING	69	316
2	03	OPERATING LEVER - 1.5" SCH 40 X 4'-10.25" LG TBE		316
2	04 (CLOSED)	GASKET FOR 8", 10" & 12" SKIMMER (CLOSED END)		NEOP
2	04 (OPEN)	GASKET FOR 8", 10" & 12" SKIMMER (OPEN)		NEOP
4	05	BUNA-N D SHAPE EXTRUSION - 3 FT 0.25 IN LG		BUNA-N
8	06	CLAMP COLLAR HALF STL 10" SKIMMER	4	316
16	07	WEDGE ANCHOR POWER-STUD 316 SS .75 X 7 7646		316
8	C	CAPSCREW HEX HD 316 SS .375 X 1.5		316
8	C	LOCK WASHER 316 SS .375		316
8	C	NUT HEX FINISHED 316 SS .375		316

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

PIPE SKIMMERS (Lever Operated)

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

We recommend that these instructions be read carefully in order to save considerable time and expense at a later date. To obtain maximum service life with the skimmer equipment, it is essential to periodically inspect the installation.

ANCHOR BOLTS

The anchor bolts are shipped with the equipment to the job site. Notify us if they are not received in order that you will not be delayed in construction.

For the quantity and size of anchor bolts required, see the general arrangement drawing(s) provided.

All recesses and openings in the structures must be accurately formed to assure proper installation of the equipment components. If any wall thimbles are to be furnished by AMWELL, the general arrangement drawing(s) provided will illustrate what will be furnished and their location.

The AMWELL lever operated skimmer is furnished either with both ends open or one end closed and other end open. Check the general arrangement drawing(s) to determine where to locate the open end and the lever operators.

THE METHOD OF INSTALLATION IS AS FOLLOWS:

(Ref. Dwgs. D211-84994-768)

1.) Install anchor bolts.

2.) Position the gaskets [5] over the anchor bolts. (Closed end gaskets do not have center outlet opening.)

3.) Starting at either end of the pipe, install the wall bearing assembly [2] onto the pipe [1] using the following procedure:

   a.) Loosely mount clamp collars [7] onto pipe.

   b.) Slide bearing assembly [2] onto pipe far enough to allow approximately 3" of pipe to project beyond end of bearing assembly [2].

4.) Lower skimmer assembly into tank taking care to note the proper orientation of closed and open ends the lever operator tank location.

5.) Slide bearing assembly [2] back over anchor bolts. Loosely secure anchor bolts.

6.) Pack ring seal [6] seat of all open end wall bearing [2] with a good grade of waterproof grease.

7.) Insert seal ring [6] into open end wall bearing [2] per installation sheets 1M-12-106 and 1M-12-107.

PIPE SKIMMERS (Lever Operated)

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

METHOD OF INSTALLATION - (Continued)

8.) At this point in installation, it will be necessary to level up pipe assemblies.

To adjust vertically, it is suggested the pipe [1] be rotated so that a transit can be set up on the lip of the pipe slot.

It is imperative that this lip be level along its entire length when in both the skimming and neutral positions. Allowable variation must not exceed 1/2".

Slots have been provided in the wall bearings [2] for adjustment purposes. Adjust as required.

Center up skimmer pipe [1] so that a 1" gap exists at each end between pipe [1] and wall.

9.) After leveling and centering up pipe [1] slide clamp collars [7] up against wall bearing [2] to lock pipe [1] in position. Securely tighten clamp collar [7] fasteners.

10.) Rotate scum pipe so that the scum slot opening is in a vertical "UP" or neutral position.

11.) Insert the operating lever mechanism [3] into one of the pipe sockets on the pipe [1] to rotate pipe.

12.) The following check points should be reviewed before initial operation of the units:

a.) Check all bolts for nuts and washers and make sure they are all secured.

b.) Pipe has been cleared of all debris.

c.) The pipe is at the proper elevation - a transit should be used to check this.

d.) Check operation of the operating mechanism.

e.) Fill tank with water and check all seal areas for leaks.

OPERATING INSTRUCTIONS

Operation of a pipe skimmer is relatively simple. The scum is removed by rotating the pipe so that the edge of the slot in the pipe is submerged, allowing scum and water to be drawn into the pipe for discharge. The amount of water discharged with the scum is determined by the length of time and depth the lip of the slot is allowed to be submerged.

The frequency of operation of the skimmer can best be determined by the individual application of each installation.

MAINTENANCE INSTRUCTIONS

Pipe skimmers require a minimum amount of attention. They have been designed for long life and, if treated properly, they will perform efficiently in your treatment process. In order to insure uninterrupted service, the following maintenance should be performed.

WEEKLY:

Visually inspect pipe for floating debris which may hamper operation or plug openings.

MONTHLY:

No maintenance required.

SEMI-ANNUALLY:

Lubricate and pack the seal ring seat in the wall bearings with a good grade of waterproof grease.

ANNUALLY:

Clean and paint equipment.
Check all fasteners.
Check all seal rings.
Check wall bearing wear strips for unusual wear or damage.

LUBRICATION INSTRUCTIONS

PIPE SKIMMERS (Lever Operated)

LUBRICATION INSTRUCTIONS

Lubricate and pack the ring seal seat of the wall bearing semi-annually using one (1) of the recommended waterproof lubricants listed below.

RECOMMENDED LUBRICANTS

Amoco - Amolith Grease All Weather

Lubriplate - 1200-2

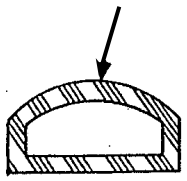
Mobil – Mobilgrease XHP222 Special

SEAL INSTALLATION

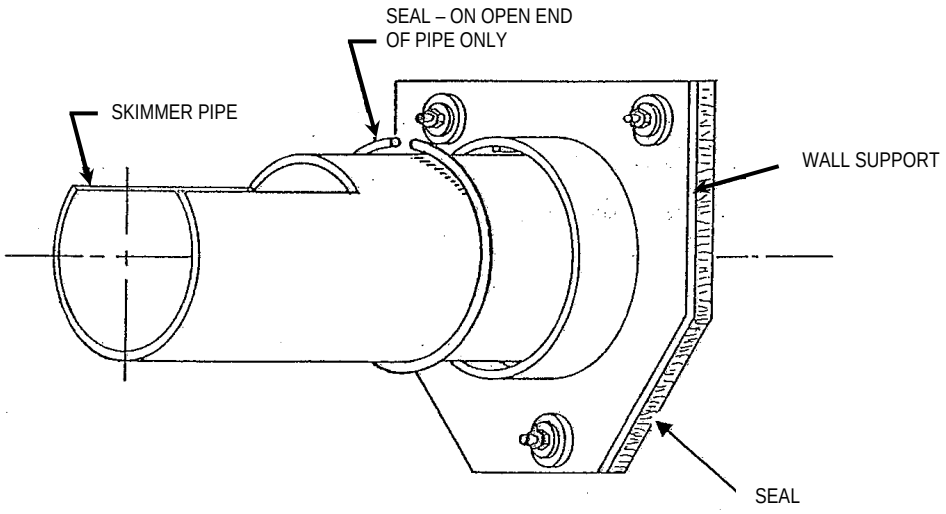
PIPE SKIMMERS

SEAL INSTALLATION

THIS SURFACE TO BEAR
AGAINST SKIMMER PIPE



CROSS SECTION THRU SEAL
(BEFORE INSTALLATION)

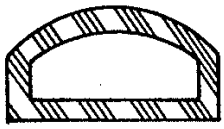


INSTALLATION OF SKIMMER PIPE

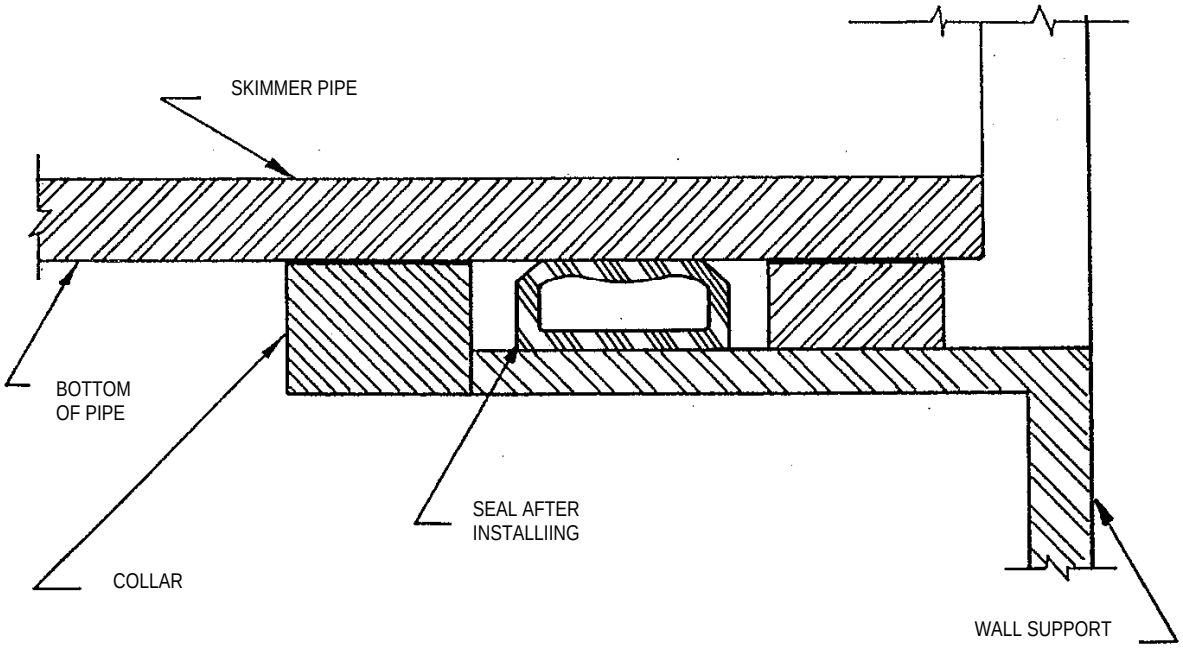
ALIGN SKIMMER PIPE BEFORE FITTING SEAL. COAT SEAL WITH GREASE AND FORCE IN PLACE. DO NOT USE SHARP INSTRUMENTS SUCH AS SCREW DRIVER OR DRIFT PIN FOR THIS OPERATION OR SEAL WILL BE DAMAGED. A WOOD BLOCK WORKS VERY NICELY TO FORCE SEAL INTO PLACE.

PIPE SKIMMERS

SEAL INSTALLATION



CROSS SECTION THRU SEAL
(BEFORE INSTALLING)



SKIMMER PIPE SEAL DETAIL

EXPANSION ANCHOR INFORMATION

Power-Stud+® SD4 & SD6

Stainless Steel Wedge Expansion Anchors

- **Consistent performance in high & low strength concrete**
- **Nominal bit size matches anchor diameter; anchor can be installed through standard fixture holes**
- **Allows follow-up expansion after setting under tensile loading**
- **Now Available in 3/4"**

NEW!

Powers®
FASTENING INNOVATIONS

Power-Stud+® SD4 & SD6

Stainless Steel Wedge Expansion Anchor

THREAD VERSION
UNC Threaded stud

ANCHOR MATERIALS
Stainless steel body and expansion clip, nut and washer

ANCHOR SIZE RANGE (TYP.)
1/4" diameter through 3/4" diameter

SUITABLE BASE MATERIALS
Normal-weight concrete
Sand-lightweight concrete
Grouted Concrete Masonry

This Product Available In

PDA®

Powers Design Assist
Real Time Anchor Design Software
www.powersdesignassist.com

CODE LISTED
ICC-ES ESR-2502
CONCRETE

PRODUCT DESCRIPTION

The Power-Stud+ SD4 and Power-Stud+ SD6 anchors are fully threaded, torque-controlled, stainless steel wedge expansion anchors which are designed for consistent performance in cracked and uncracked concrete. Suitable base materials are normal-weight, sand-lightweight concrete, and grouted concrete masonry (CMU). The anchor is manufactured with a stainless steel body and expansion clip. Nut and washer are included.

GENERAL APPLICATIONS AND USES

- Structural connections, i.e., beam and column anchorage
- Safety-related and common attachments
- Interior and exterior applications
- Tension zone applications, i.e., cable trays and strut, pipe supports, fire sprinklers

FEATURES AND BENEFITS

- Knurled mandrel design provides consistent performance in cracked concrete and helps prevent galling during service life.
- Nominal drill bit size is the same as the anchor diameter
- Anchor can be installed through standard clearance fixture holes
- Length ID code and identifying marking stamped on head of each anchor
- Anchor design allows for follow-up expansion after setting under tensile loading
- Corrosion resistant stainless steel anchors
- Domestically manufactured by request, call for details

APPROVALS AND LISTINGS

International Code Council Evaluation Service (ICC-ES), ESR-2502 for cracked and uncracked concrete [2012 IBC & IRC, 2009 IBC & IRC, and 2006 IBC & IRC]

Tested in accordance with ACI 355.2 and ICC-ES AC193 for use in structural concrete under the design provisions of ACI 318 (Strength Design method using Appendix D)

Evaluated and qualified by an accredited independent testing laboratory for recognition in cracked and uncracked concrete including seismic and wind loading (Category 1 anchors)

GUIDE SPECIFICATIONS

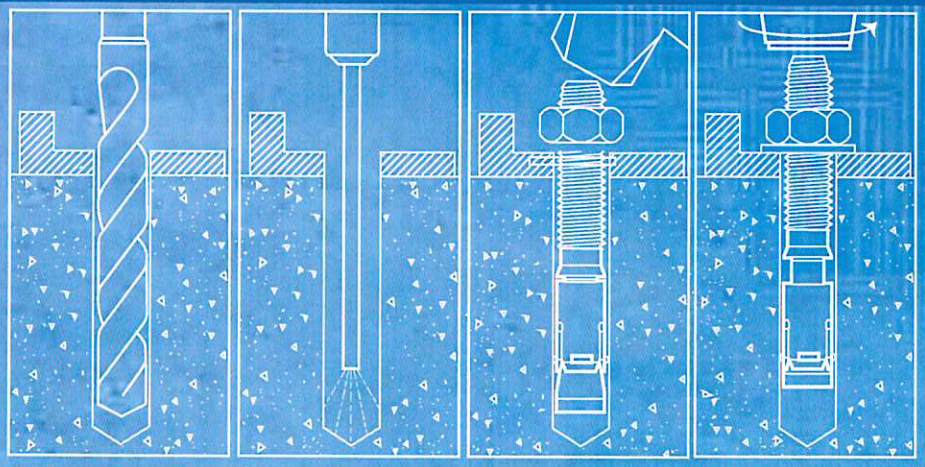
CSI Divisions: 031600-Concrete Anchors, 04 05 19.16 - Masonry Anchors and 050519 Post-installed Concrete Anchors. Expansion anchors shall be Power-Stud+ SD4 and Power-Stud+ SD6 as supplied by Powers Fasteners, Inc., Brewster, NY. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

MATERIAL SPECIFICATIONS

Anchor component	Specification	
	SD4[1]	SD6[1]
Anchor body	Type 304 Stainless Steel	Type 316 Stainless Steel
Washer	300 Series Stainless Steel	Type 316 Stainless Steel
Hex Nut	Type 316 Stainless Steel	
Expansion wedge (clip)	Type 316 Stainless Steel	

1. Domestically manufactured anchors are available upon request (see ordering information for details).

INSTALLATION INSTRUCTIONS



Step 1
Using the proper drill bit size, drill a hole into the base material to the required depth. The tolerances of the drill bit used should meet the requirements of ANSI Standard B212.15.

Step 2
Remove dust and debris from the hole using a hand pump, compressed air or a vacuum to remove loose particles left from drilling.

Step 3
Position the supplied washer on the anchor and thread on the supplied nut. If installing through a fixture, drive the anchor through the fixture into the hole. Be sure the anchor is driven to the minimum required embedment depth.

Step 4
Tighten the anchor with a torque wrench by applying the required installation torque, T_{inst}.

Length Identification		
Mark	From	Up to but not including
A	1-1/2"	2"
B	2"	2-1/2"
C	2-1/2"	3"
D	3"	3-1/2"
E	3-1/2"	4"
F	4"	4-1/2"
G	4-1/2"	5"
H	5"	5-1/2"
I	5-1/2"	6"
J	6"	6-1/2"
K	6-1/2"	7"
L	7"	7-1/2"
M	7-1/2"	8"
N	8"	8-1/2"
O	8-1/2"	9"
P	9"	9-1/2"
Q	9-1/2"	10"
R	10"	10-1/2"

Length identification mark indicates overall length of anchor.

REFERENCE DATA (ASD)

Installation Table for Power-Stud+ SD4 & Power-Stud+ SD6

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Diameter (inch)				
			1/4	3/8	1/2	5/8	3/4
Anchor outside diameter	d	in. (mm)	0.25 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)
Nominal drill bit diameter	d_{bit}	in.	1/4 ANSI	3/8 ANSI	1/2 ANSI	5/8 ANSI	3/4 ANSI
Minimum diameter of hole clearance in fixture	d_h	in. (mm)	5/16 (7.9)	7/16 (11.1)	9/16 (14.3)	11/16 (17.5)	13/16 (20.6)
Minimum embedment depth	h_{nom}	in. (mm)	1-3/4 (44)	1-7/8 (48)	2-1/2 (64)	3-1/4 (83)	3-3/4 (95)
Minimum hole depth	h_o	in. (mm)	1-7/8 (48)	2 (51)	2-5/8 (67)	3-1/2 (89)	4 (102)
Installation torque	T_{inst}	ft.-lbf. (N-m)	6 (8)	25 (34)	40 (54)	60 (81)	110 (149)
Torque wrench/socket size	-	in.	7/16	9/16	3/4	15/16	1-1/8
Nut height	-	in.	7/32	21/64	7/16	35/64	41/64

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m.

Head Marking

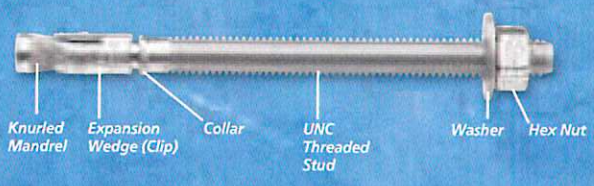
Legend

Letter Code = Length Identification Mark

'+' Symbol = Strength Design Compliant Anchor (see ordering information, symbol not on 1/4" diameter anchors)

Number Code = Stainless Steel Body Type (4, or 6)

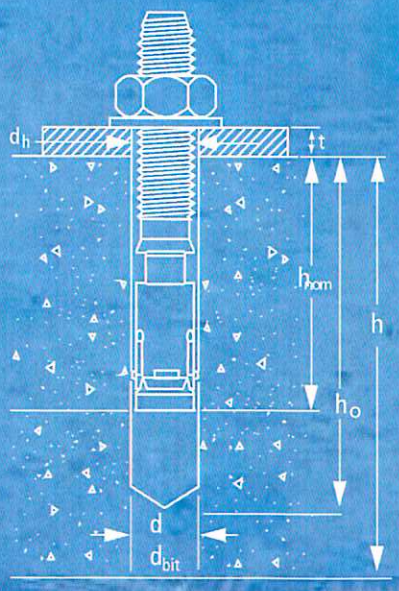
Anchor Assembly



ASD Installation Detail

Nomenclature

d = Diameter of anchor
d_{bit} = Diameter of drill bit
d_h = Diameter of fixture clearance hole
h = Base material thickness
The minimum value of h should be $1.5h_{nom}$ or 3" whichever is greater
h_{nom} = Minimum embedment depth



Power-Stud+® SD4 & SD6

REFERENCE DATA (ASD)

Ultimate Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 in Normal-Weight Concrete[1,2]

Nominal Anchor Diameter in.	Minimum Embedment Depth h_{nom} in. (mm)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi (17.3 MPa)		f'c = 3,000 psi (20.7 MPa)		f'c = 4,000 psi (27.6 MPa)		f'c = 6,000 psi (41.4 MPa)		f'c = 8,000 psi (55.2 MPa)	
		Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)
1/4	1-1/8 (29)	1,095 (4.9)	2,135 (9.5)	1,200 (5.3)	2,135 (9.5)	1,390 (6.2)	2,135 (9.5)	1,455 (6.5)	2,135 (9.5)	1,680 (7.5)	2,135 (9.5)
	1-3/4 (44)	1,890 (8.4)	2,135 (9.5)	2,070 (9.2)	2,135 (9.5)	2,390 (10.6)	2,135 (9.5)	2,480 (11.0)	2,135 (9.5)	2,480 (11.0)	2,135 (9.5)
3/8	1-3/8 (41)	1,530 (6.8)	2,745 (12.2)	1,680 (7.5)	2,745 (12.2)	1,940 (8.6)	2,745 (12.2)	2,520 (11.2)	2,745 (12.2)	2,910 (12.9)	2,745 (12.2)
	1-7/8 (48)	2,790 (12.4)	2,745 (12.2)	3,060 (13.6)	2,745 (12.2)	3,530 (15.7)	2,745 (12.2)	4,195 (18.7)	2,745 (12.2)	4,840 (21.5)	2,745 (12.2)
	3 (76)	4,700 (20.9)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)	4,895 (21.8)	2,745 (12.2)
1/2	1-7/8 (48)	2,745 (12.2)	5,090 (22.6)	3,010 (13.4)	5,090 (22.6)	3,475 (15.5)	5,090 (22.6)	4,525 (20.1)	5,090 (22.6)	5,230 (23.3)	5,090 (22.6)
	2-3/8 (60)	5,370 (23.9)	5,090 (22.6)	5,880 (26.2)	5,090 (22.6)	6,790 (30.2)	5,090 (22.6)	6,790 (30.2)	5,090 (22.6)	7,845 (34.9)	5,090 (22.6)
	3-3/4 (95)	8,840 (39.3)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)	9,300 (41.4)	5,090 (22.6)
5/8	2-1/2 (64)	5,015 (22.3)	9,230 (41.1)	5,495 (24.4)	9,230 (41.1)	6,345 (28.2)	9,230 (41.1)	7,250 (32.2)	9,230 (41.1)	8,370 (37.2)	9,230 (41.1)
	3-1/4 (83)	6,760 (30.1)	9,230 (41.1)	7,405 (32.9)	9,230 (41.1)	8,560 (38.1)	9,230 (41.1)	9,615 (42.8)	9,230 (41.1)	11,105 (49.4)	9,230 (41.1)
	4-3/4 (121)	10,550 (46.9)	9,230 (41.1)	11,555 (51.4)	9,230 (41.1)	13,345 (59.4)	9,230 (41.1)	14,560 (64.8)	9,230 (41.1)	14,560 (64.8)	9,230 (41.1)
3/4	3-3/8 (86)	6,695 (29.8)	11,255 (50.1)	7,330 (32.6)	12,625 (56.2)	8,465 (37.7)	14,580 (64.9)	9,705 (43.2)	15,440 (68.7)	11,210 (49.9)	15,440 (68.7)
	4-1/2 (114)	10,800 (48.0)	15,440 (68.7)	11,830 (52.6)	15,440 (68.7)	13,575 (60.4)	15,440 (68.7)	17,110 (76.1)	15,440 (68.7)	19,760 (87.9)	15,440 (68.7)
	5-5/8 (143)	11,730 (52.2)	15,440 (68.7)	12,850 (57.2)	15,440 (68.7)	13,575 (60.4)	15,440 (68.7)	19,710 (87.7)	15,440 (68.7)	21,705 (96.5)	15,440 (68.7)

1. Tabulated load values are for anchors installed in uncracked concrete with no edge or spacing considerations. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working loads.

REFERENCE DATA (ASD)

Allowable Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 in Normal-Weight Concrete[1,2,3,4]

Nominal Anchor Diameter in.	Minimum Embedment Depth h_{nom} in. (mm)	Minimum Concrete Compressive Strength									
		f'c = 2,500 psi (17.3 MPa)		f'c = 3,000 psi (20.7 MPa)		f'c = 4,000 psi (27.6 MPa)		f'c = 6,000 psi (41.4 MPa)		f'c = 8,000 psi (55.2 MPa)	
		Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)	Tension lbs (kN)	Shear lbs (kN)
1/4	1-1/8 (28)	275 (1.2)	535 (2.4)	300 (1.3)	535 (2.4)	350 (1.6)	535 (2.4)	365 (1.6)	535 (2.4)	420 (1.9)	535 (2.4)
	1-3/4 (44)	475 (2.1)	535 (2.4)	520 (2.3)	535 (2.4)	600 (2.7)	535 (2.4)	620 (2.8)	535 (2.4)	620 (2.8)	535 (2.4)
3/8	1-3/8 (41)	385 (1.7)	685 (3.0)	420 (1.9)	685 (3.0)	485 (2.2)	685 (3.0)	630 (2.8)	685 (3.0)	730 (3.2)	685 (3.0)
	1-7/8 (60)	700 (3.1)	685 (3.0)	765 (3.4)	685 (3.0)	885 (3.9)	685 (3.0)	1,050 (4.7)	685 (3.0)	1,210 (5.4)	685 (3.0)
	3 (60)	1,175 (5.2)	685 (3.0)	1,225 (5.4)	685 (3.0)	1,225 (5.4)	685 (3.0)	1,225 (5.4)	685 (3.0)	1,225 (5.4)	685 (3.0)
1/2	1-7/8 (57)	685 (3.0)	1,275 (5.7)	755 (3.4)	1,275 (5.7)	870 (3.9)	1,275 (5.7)	1,130 (5.0)	1,275 (5.7)	1,310 (5.8)	1,275 (5.7)
	2-3/8 (64)	1,345 (6.0)	1,275 (5.7)	1,470 (6.5)	1,275 (5.7)	1,700 (7.6)	1,275 (5.7)	1,700 (7.6)	1,275 (5.7)	1,960 (8.7)	1,275 (5.7)
	3-3/4 (95)	2,210 (9.8)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)	2,325 (10.3)	1,275 (5.7)
5/8	2-1/2 (70)	1,255 (5.6)	2,310 (10.3)	1,375 (6.1)	2,310 (10.3)	1,585 (7.1)	2,310 (10.3)	1,815 (8.1)	2,310 (10.3)	2,095 (9.3)	2,310 (10.3)
	3-1/4 (86)	1,690 (7.5)	2,310 (10.3)	1,850 (8.2)	2,310 (10.3)	2,140 (9.5)	2,310 (10.3)	2,405 (10.7)	2,310 (10.3)	2,775 (12.3)	2,310 (10.3)
	4-3/4 (117)	2,640 (11.7)	2,310 (10.3)	2,890 (12.9)	2,310 (10.3)	3,335 (14.8)	2,310 (10.3)	3,640 (16.2)	2,310 (10.3)	3,640 (16.2)	2,310 (10.3)
3/4	3-3/8 (86)	1,675 (7.5)	2,815 (12.5)	1,835 (8.2)	3,155 (14.0)	2,115 (9.4)	3,645 (16.2)	2,425 (10.8)	3,860 (17.2)	2,805 (12.5)	3,860 (17.2)
	4-1/2 (114)	2,700 (12.0)	3,860 (17.2)	2,960 (13.2)	3,860 (17.2)	3,395 (15.1)	3,860 (17.2)	4,280 (19.0)	3,860 (17.2)	4,940 (22.0)	3,860 (17.2)
	5-5/8 (143)	2,935 (13.1)	3,860 (17.2)	3,215 (14.3)	3,860 (17.2)	3,395 (15.1)	3,860 (17.2)	4,930 (21.9)	3,860 (17.2)	5,425 (24.1)	3,860 (17.2)

1. Tabulated load values are for anchors installed in uncracked concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Allowable load capacities listed are calculated using and applied safety factor of 4.0.
3. Allowable load capacities must be multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.
4. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.

Power-Stud+® SD4 & SD6

REFERENCE DATA (ASD)

Spacing Distance and Edge Distance Adjustment Factors for Normal Weight Concrete - Tension (F_{NS}, F_{NC})

Spacing Reduction Factors - Tension (F_{NS})						
Diameter (in)		1/4	3/8	1/2	5/8	3/4
Nominal Embed. h_{nom} (in)		1-3/4	1-7/8	2-1/2	3-1/4	4-1/2
Minimum Spacing, s_{min} (in)		2	3	3	5	5
Spacing Distance (inches)	1-3/4	-	-	-	-	-
	2	0.79	-	-	-	-
	2-1/4	0.81	-	-	-	-
	2-1/2	0.83	-	-	-	-
	2-3/4	0.85	-	-	-	-
	3	0.87	0.87	0.82	-	-
	3-1/2	0.91	0.91	0.85	-	-
	4	0.96	0.96	0.88	-	-
	4-1/2	1.00	1.00	0.91	-	-
	5	1.00	1.00	0.94	0.85	0.76
	5-1/2	1.00	1.00	0.97	0.87	0.78
	6	1.00	1.00	1.00	0.90	0.80
	6-1/2	1.00	1.00	1.00	0.92	0.82
	7	1.00	1.00	1.00	0.94	0.84
	7-1/2	1.00	1.00	1.00	0.97	0.86
	8	1.00	1.00	1.00	0.99	0.87
	8-1/4	1.00	1.00	1.00	1.00	0.88
	8-1/2	1.00	1.00	1.00	1.00	0.89
	9	1.00	1.00	1.00	1.00	0.91
	9-1/2	1.00	1.00	1.00	1.00	0.93
	10	1.00	1.00	1.00	1.00	0.95
	10-1/2	1.00	1.00	1.00	1.00	0.97
	11	1.00	1.00	1.00	1.00	0.99
	11-1/4	1.00	1.00	1.00	1.00	1.00

Edge Distance Reduction Factors- Tension (F_{NC})						
Diameter (in)		1/4	3/8	1/2	5/8	3/4
Nominal Embed. h_{nom} (in)		1-3/4	1-7/8	2-1/2	3-1/4	4-1/2
Critical Edge Distance, c_{ac} (in)		5	5	7-1/2	9-1/2	9
Min. Edge Distance, c_{min} (in)		1-3/4	3	3	4-1/2	5
Edge Distance (inches)	1-1/2	-	-	-	-	-
	1-3/4	0.35	-	-	-	-
	2	0.40	-	-	-	-
	2-1/4	0.45	-	-	-	-
	2-1/2	0.50	-	-	-	-
	2-3/4	0.55	-	-	-	-
	3	0.60	0.60	0.40	-	-
	3-1/2	0.70	0.70	0.47	-	-
	4	0.80	0.80	0.53	-	-
	4-1/2	0.90	0.90	0.60	0.47	-
	5	1.00	1.00	0.67	0.53	0.56
	5-1/2	1.00	1.00	0.73	0.58	0.61
	6	1.00	1.00	0.80	0.63	0.67
	6-1/2	1.00	1.00	0.87	0.68	0.72
	7	1.00	1.00	0.93	0.74	0.78
	7-1/2	1.00	1.00	1.00	0.79	0.83
	8	1.00	1.00	1.00	0.84	0.89
	8-1/2	1.00	1.00	1.00	0.89	0.94
	9	1.00	1.00	1.00	0.95	1.00
	9-1/2	1.00	1.00	1.00	1.00	1.00

Spacing Distance and Edge Distance Adjustment Factors for Normal Weight Concrete - Shear (F_{VS}, F_{VC})

Spacing Reduction Factors - Shear (F_{VS})						
Diameter (in)		1/4	3/8	1/2	5/8	3/4
Nominal Embed. h_{nom} (in)		1-3/4	1-7/8	2-1/2	3-1/4	4-1/2
Minimum Spacing, s_{min} (in)		2	3	3	5	5
Spacing Distance (inches)	1-3/4	-	-	-	-	-
	2	0.87	-	-	-	-
	2-1/4	0.88	-	-	-	-
	2-1/2	0.90	-	-	-	-
	2-3/4	0.91	-	-	-	-
	3	0.92	0.92	0.89	-	-
	3-1/2	0.95	0.95	0.91	-	-
	4	0.97	0.97	0.93	-	-
	4-1/2	1.00	1.00	0.95	-	-
	5	1.00	1.00	0.96	0.91	0.84
	5-1/2	1.00	1.00	0.98	0.93	0.85
	6	1.00	1.00	1.00	0.94	0.86
	6-1/2	1.00	1.00	1.00	0.95	0.88
	7	1.00	1.00	1.00	0.97	0.89
	7-1/2	1.00	1.00	1.00	0.98	0.90
	8	1.00	1.00	1.00	0.99	0.92
	8-1/4	1.00	1.00	1.00	1.00	0.92
	8-1/2	1.00	1.00	1.00	1.00	0.93
	9	1.00	1.00	1.00	1.00	0.94
	9-1/2	1.00	1.00	1.00	1.00	0.95
	10	1.00	1.00	1.00	1.00	0.97
	10-1/2	1.00	1.00	1.00	1.00	0.98
	11	1.00	1.00	1.00	1.00	0.99
	11-1/4	1.00	1.00	1.00	1.00	1.00

Edge Distance Reduction Factors - Shear (F_{VC})						
Diameter (in)		1/4	3/8	1/2	5/8	3/4
Nominal Embed. h_{nom} (in)		1-3/4	1-7/8	2-1/2	3-1/4	4-1/2
Min. Edge Distance, c_{min} (in)		1-3/4	3	3	4-1/2	5
Edge Distance (inches)	1-1/2	-	-	-	-	-
	1-3/4	0.39	-	-	-	-
	2	0.44	-	-	-	-
	2-1/4	0.50	-	-	-	-
	2-1/2	0.56	-	-	-	-
	2-3/4	0.61	-	-	-	-
	3	0.67	0.67	-	-	-
	3-1/2	0.78	0.78	-	-	-
	4	0.89	0.89	-	-	-
	4-1/2	1.00	1.00	-	0.55	-
	5	1.00	1.00	-	0.61	0.44
	5-1/2	1.00	1.00	-	0.67	0.49
	6	1.00	1.00	1.00	0.73	0.53
	6-1/2	1.00	1.00	1.00	0.79	0.58
	7	1.00	1.00	1.00	0.85	0.62
	7-1/2	1.00	1.00	1.00	0.91	0.67
	8	1.00	1.00	1.00	0.97	0.71
	8-1/4	1.00	1.00	1.00	1.00	0.73
	8-1/2	1.00	1.00	1.00	1.00	0.76
	9	1.00	1.00	1.00	1.00	0.80
	9-1/2	1.00	1.00	1.00	1.00	0.84
	10	1.00	1.00	1.00	1.00	0.89
	10-1/2	1.00	1.00	1.00	1.00	0.93
	11	1.00	1.00	1.00	1.00	0.98
	11-1/4	1.00	1.00	1.00	1.00	1.00

PERFORMANCE DATA

Ultimate Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 installed into the Face of Grout Filled Concrete Masonry[1,2]

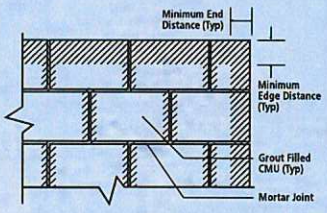
Nominal Anchor Diameter in.	Minimum Embedment h_{nom} in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Ultimate Tension Load lb (kN)	Direction of Shear Loading	Ultimate Shear Load lb (kN)
1/2	2-3/8 (60)	3 (76.2)	3 (76.2)	1,695 (7.5)	Any	2,080 (9.3)
		12 (304.8)	12 (304.8)	2,425 (10.8)	Any	4,905 (21.8)
5/8	3-1/4 (83)	12 (304.8)	12 (304.8)	5,565 (24.8)	Any	7,944 (35.3)

1. Tabulated load values are for anchors installed in minimum 8 inch wide, minimum Grade N, Type II, normal-weight concrete masonry units conforming to ASTM C 90. Mortar must be minimum Type N. Masonry compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 5.0 or greater to determine allowable working loads.

Allowable Load Capacities for Power-Stud+ SD4 and Power-Stud+ SD6 installed into the Face of Grout Filled Concrete Masonry[1,2,3,4,5]

Nominal Anchor Diameter in.	Minimum Embedment h_{nom} in. (mm)	Minimum Edge Distance in. (mm)	Minimum End Distance in. (mm)	Allowable Tension Load lb (kN)	Direction of Shear Loading	Allowable Shear Load lb (kN)
1/2	2-3/8 (60)	3 (76.2)	3 (76.2)	340 (1.5)	Any	415 (1.8)
		12 (304.8)	12 (304.8)	485 (2.2)	Any	980 (4.4)
5/8	3-1/4 (83)	12 (304.8)	12 (304.8)	1,115 (5.0)	Any	1,590 (7.1)

1. Tabulated load values are for anchors installed in minimum 8 inch wide, minimum Grade N, Type II, normal-weight concrete masonry units conforming to ASTM C 90. Mortar must be minimum Type N. Masonry compressive strength must be at the specified minimum at the time of installation.
2. Allowable load capacities listed are calculated using an applied safety factor of 5.0. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety.
3. The tabulated values are applicable for anchors installed in grouted masonry wall faces at a critical spacing distance, s_{cr}, between anchors of 16 times the anchor diameter. The spacing distance between two anchors may be reduced to a minimum distance, s_{min}, of 8 times the anchor diameter provided the allowable tension loads are multiplied a reduction factor of 0.80 and allowable shear loads are multiplied by a reduction factor of 0.90. Linear interpolation for calculation of allowable loads may be used for intermediate anchor spacing distances.
4. Anchors may be installed in the grouted cells and in cell webs and bed joints not closer than 1-3/8" from head joints. The minimum edge and end distances must also be maintained.
5. Allowable tension values for anchors installed into bed joints of grouted masonry wall faces with a minimum of 12" edge and end distance may be increased by 20 percent for the 1/2-inch diameter and 10 percent for the 5/8-inch diameter.



Wall Face
Permissible Anchor Locations
(Un-hatched Area)

Power-Stud+® SD4 & SD6

STRENGTH DESIGN (SD)

CODE LISTED
ICC-ES ESR-2502

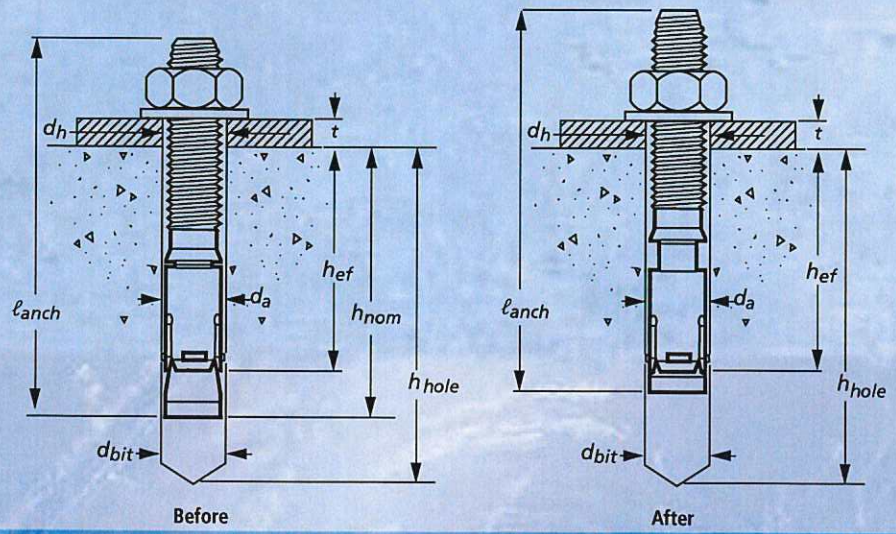
Strength Design Installation Table for Power-Stud+ SD4 and Power-Stud+ SD6[1,4]

Anchor Property/Setting Information	Notation	Units	Nominal Anchor Diameter									
			1/4	3/8		1/2		5/8		3/4		
Anchor outside diameter	d_a [d_o][5]	in. (mm)	0.250 (6.4)	0.375 (9.5)		0.500 (12.7)		0.625 (15.9)		0.750 (19.1)		
Minimum diameter of hole clearance in fixture	d_h	in. (mm)	5/16 (7.9)	7/16 (11.1)		9/16 (14.3)		11/16 (17.5)		13/16 (20.6)		
Nominal drill bit diameter	d_{bit}	in.	1/4 ANSI	3/8 ANSI		1/2 ANSI		5/8 ANSI		3/4 ANSI		
Minimum nominal embedment depth[2]	h_{nom}	in. (mm)	1-3/4 (44)	1-7/8 (48)		2-1/2 (64)		3-1/4 (83)		4-1/2 (114)		
Effective embedment	h_{ef}	in. (mm)	1.50 (38)	1.50 (38)		2.00 (51)		2.75 (70)		3-3/4 (95)		
Minimum hole depth	h_{hole}	in. (mm)	1-7/8 (48)	2 (51)		2-5/8 (67)		3-1/2 (89)		4-3/4 (121)		
Minimum member thickness	h_{min}	in. (mm)	3-1/4 (83)	3-1/4 (83)	4 (102)	4 (102)		5 (127)		6 (152)		
Minimum overall anchor length[3]	l_{anch}	in. (mm)	2-1/4 (57)	2-3/4 (70)		3-3/4 (95)		4-1/2 (114)		5-1/2 (140)		
Minimum edge distance	c_{min}	in. (mm)	1-3/4 (44)	3 (76)	3-1/2 (89)	6 (152)	3 (76)	4-1/2 (114)	8-1/2 (216)	5 (127)	9 (229)	
Minimum spacing distance	s_{min}	in. (mm)	2 (51)	5-1/2 (140)	3 (76)	3 (76)	6 (152)	8-1/2 (216)	5 (127)	9 (229)	5 (127)	
Critical edge distance	c_{ac}	in. (mm)	5 (127)	5 (127)		7-1/2 (191)		9-1/2 (241)		9 (229)		
Installation torque	T_{inst}	ft.-lbf. (N-m)	6 (8)	25 (34)		40 (54)		60 (81)		110 (149)		
Torque wrench/socket size	-	in.	7/16	9/16		3/4		15/16		1-1/8		
Nut height	-	in.	7/32	21/64		7/16		35/64		41/64		

For SI: 1 inch = 25.4 mm; 1 ft-lbf = 1.356 N-m.

1. The information presented in this table is to be used in conjunction with ACI 318 Appendix D.
2. The embedment depth, h_{nom}, is measured from the outside surface of the concrete member to the embedded end of the anchor prior to tightening.
3. The listed minimum overall anchor length is based on anchor sizes commercially available at the time of publication compared with the requirements to achieve the minimum nominal embedment depth and possible fixture attachment.
4. The anchors may be installed in the topside of concrete-filled steel deck floor and roof assemblies in accordance with the following: the 1/4-inch diameter anchors must be installed in uncracked normal-weight or sand-lightweight concrete; 3/8-inch to 3/4-inch diameter anchors must be installed in cracked and uncracked normal-weight or sand-lightweight concrete over steel deck having a minimum specified compressive strength, f'c, of 3,000 psi (20.7 MPa) provided the concrete thickness above the upper flute meets the minimum thickness specified in this table.
5. The notation in brackets is for the 2006 IBC.

Power-Stud+ SD4 & Power-Stud+ SD6 Anchor Detail



STRENGTH DESIGN (SD)

CODE LISTED
ICC-ES ESR-2502

Tension Design Information for Power-Stud+ SD4 and Power-Stud+ SD6 Anchors in Concrete (For use with load combinations taken from ACI 318, Section 9.2)[1,7]

Design Characteristic	Notation	Units	Nominal Anchor Diameter				
			1/4	3/8	1/2	5/8	3/4
Anchor category	1,2 or 3	-	1	1	1	1	1
Nominal embedment depth	h_{nom}	in.	1-3/4	1-7/8	2-3/8	3-1/4	4-1/2
STEEL STRENGTH IN TENSION[4]							
Minimum specified yield strength (neck)	f_y	ksi (N/mm²)	60 (414)	60 (414)	60 (414)	60 (414)	60 (414)
Minimum specified ultimate tensile strength (neck)	f_{uta}	ksi (N/mm²)	90 (621)	90 (621)	90 (621)	90 (621)	90 (621)
Effective tensile stress area (neck)	$A_{se,N}$ [A_{sa}][9]	in² (mm²)	0.0249 (16.1)	0.0530 (34.2)	0.1020 (65.8)	0.1630 (105.2)	0.2380 (151)
Steel strength in tension	N_{sa}	lb (kN)	2,240 (10.0)	4,780 (21.3)	9,160 (40.8)	14,635 (65.1)	21,380 (95.1)
Reduction factor for steel strength[2]	ϕ	-	0.75				
CONCRETE BREAKOUT STRENGTH IN TENSION							
Effective embedment	h_{ef}	in. (mm)	1.50 (38)	1.50 (38)	2.00 (51)	2.75 (70)	3.75 (95)
Effectiveness factor for uncracked concrete	k_{uncr}	-	24	24	24	24	24
Effectiveness factor for cracked concrete	k_{cr}	-	Not Applicable	17	21	21	21
Modification factor for cracked and uncracked concrete	$\psi_{c,N}$	-	1.0 See Note 4	1.0 See Note 4	1.0 See Note 4	1.0 See Note 4	1.0 See Note 4
Critical edge distance (uncracked concrete only)	c_{ac}	in. (mm)	5 (127)	5 (127)	7-1/2 (191)	9-1/2 (241)	9 (229)
Reduction factor for concrete breakout strength[3]	ϕ	-	0.65 (Condition B)				
PULLOUT STRENGTH IN TENSION (NON-SEISMIC APPLICATIONS)							
Characteristic pullout strength, uncracked concrete (2,500 psi)[5]	$N_{p,uncr}$	lb (kN)	1,510 (6.7)	See Note 6	See Note 6	See Note 6	8,520 (37.8)
Characteristic pullout strength, cracked concrete (2,500 psi)[5]	$N_{p,cr}$	lb (kN)	Not Applicable	See Note 6	See Note 6	See Note 6	See Note 6
Reduction factor for pullout strength[3]	ϕ	-	0.65 (Condition B)				
PULLOUT STRENGTH IN TENSION FOR SEISMIC APPLICATIONS8							
Characteristic pullout strength, seismic (2,500 psi)[5,8]	$N_{p,eq}$	lb (kN)	Not Applicable	1,645 (7.3)	See Note 6	See Note 6	See Note 6
Reduction factor for pullout strength[3]	ϕ	-	0.65 (Condition B)				

For SI: 1 inch = 25.4 mm; 1 ft-lbf = 1.356 N-m; 1 ksi = 6.894 N/mm²; 1 lb = 0.0044 kN.

1. The data in this table is intended to be used with the design provisions of ACI 318 Appendix D; for anchors resisting seismic load combinations the additional requirements of ACI 318 D.3.3 shall apply.
2. The tabulated value of ϕ for steel strength applies when the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ for steel strength must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 and -05 D.4.5). The anchors are ductile steel elements as defined in ACI 318 D.1.
3. The tabulated value of ϕ for concrete breakout strength and pullout strength applies when both the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition A are satisfied, the appropriate value of ϕ for concrete breakout strength and pullout strength must be determined in accordance with ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4). If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ for concrete breakout strength and pullout strength must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 or -05 D.4.5).
4. For all design cases $\psi_{c,N} = 1.0$. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.
5. For all design cases $\psi_{c,P} = 1.0$. For concrete compressive strength greater than 2,500psi, N_{pn} = (pullout strength value from table)*(specified concrete strength/2500)$^{0.5}$.
6. Pullout strength does not control design of indicated anchors. Do not calculate pullout strength for indicated anchor size and embedment.
7. Anchors are permitted to be used in sand-lightweight concrete provided that the modification factor λ_a (ACI 318-11) or λ (ACI 318-08) for concrete breakout strength is taken as 0.6 in lieu of ACI 318-11 D.3.6 (2012 IBC) or ACI 318-08 D.3.4 (2009 IBC). In addition, the pullout strength $N_{p,cr}$, $N_{p,eq}$, $N_{p,uncr}$ must be multiplied by 0.6, as applicable. For ACI 318-05, the values N_b, $N_{p,eq}$, $N_{p,cr}$, $N_{p,uncr}$ and V_b must be multiplied by 0.6.
8. Tabulated values for characteristic pullout strength in tension are for seismic applications and based on test results per ACI 355.2 Section 9.5.
9. The notation in brackets is for the 2006 IBC.

Power-Stud+® SD4 & SD6

STRENGTH DESIGN (SD)

CODE LISTED
ICC-ES ESR-2502

Tension Design Information for Power-Stud+ SD4 and Power-Stud+ SD6 Anchors in Concrete (For use with load combinations taken from ACI 318, Section 9.2)[1,7]

Design Characteristic	Notation	Units	Nominal Anchor Diameter				
			1/4	3/8	1/2	5/8	3/4
Anchor category	1,2 or 3	-	1	1	1	1	1
Nominal embedment depth	h_{nom}	in.	1-3/4	1-7/8	2-3/8	3-1/4	4-1/2
STEEL STRENGTH IN TENSION[4]							
Minimum specified yield strength (neck	f_y	ksi (N/mm²)	60 (414)	60 (414)	60 (414)	60 (414)	60 (414)
Minimum specified ultimate tensile strength (neck)	f_{uta}	ksi (N/mm²)	90 (621)	90 (621)	90 (621)	90 (621)	90 (621)
Effective tensile stress area (neck)	$A_{se,N}$ [A_{sa}][9]	in² (mm²)	0.0249 (16.1)	0.0530 (34.2)	0.1020 (65.8)	0.1630 (105.2)	0.2380 (151)
Steel strength in tension	N_{sa}	lb (kN)	2,240 (10.0)	4,780 (21.3)	9,160 (40.8)	14,635 (65.1)	21,380 (95.1)
Reduction factor for steel strength[2]	ϕ	-	0.75				
CONCRETE BREAKOUT STRENGTH IN TENSION							
Effective embedment	h_{ef}	in. (mm)	1.50 (38)	1.50 (38)	2.00 (51)	2.75 (70)	3.75 (95)
Effectiveness factor for uncracked concrete	k_{uncr}	-	24	24	24	24	24
Effectiveness factor for cracked concrete	k_{cr}	-	Not Applicable	17	21	21	21
Modification factor for cracked and uncracked concrete	$\psi_{c,N}$	-	1.0 See Note 4	1.0 See Note 4	1.0 See Note 4	1.0 See Note 4	1.0 See Note 4
Critical edge distance (uncracked concrete only)	c_{ac}	in. (mm)	5 (127)	5 (127)	7-1/2 (191)	9-1/2 (241)	9 (229)
Reduction factor for concrete breakout strength[3]	ϕ	-	0.65 (Condition B)				
PULLOUT STRENGTH IN TENSION (NON-SEISMIC APPLICATIONS)							
Characteristic pullout strength, uncracked concrete (2,500 psi)[5]	$N_{p,uncr}$	lb (kN)	1,510 (6.7)	See Note 6	See Note 6	See Note 6	8,520 (37.8)
Characteristic pullout strength, cracked concrete (2,500 psi)[5]	$N_{p,cr}$	lb (kN)	Not Applicable	See Note 6	See Note 6	See Note 6	See Note 6
Reduction factor for pullout strength[3]	ϕ	-	0.65 (Condition B)				
PULLOUT STRENGTH IN TENSION FOR SEISMIC APPLICATIONS[8]							
Characteristic pullout strength, seismic (2,500 psi)[5,8]	$N_{p,eq}$	lb (kN)	Not Applicable	1,645 (7.3)	See Note 6	See Note 6	See Note 6
Reduction factor for pullout strength[3]	ϕ	-	0.65 (Condition B)				

For SI: 1 inch = 25.4 mm; 1 ft-lbf = 1.356 N-m; 1 ksi = 6.894 N/mm²; 1 lb = 0.0044 kN.

1. The data in this table is intended to be used with the design provisions of ACI 318 Appendix D; for anchors resisting seismic load combinations the additional requirements of ACI 318 D.3.3 shall apply.
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3. The tabulated value of ϕ for concrete breakout strength and pullout strength applies when both the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition A are satisfied, the appropriate value of ϕ for concrete breakout strength and pullout strength must be determined in accordance with ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4). If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ for concrete breakout strength and pullout strength must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 or -05 D.4.5).
4. For all design cases $\psi_{c,N}$ = 1.0. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.
5. For all design cases $\psi_{c,P}$ = 1.0. For concrete compressive strength greater than 2,500psi, N_{pn} = (pullout strength value from table)*(specified concrete strength/2500)$^{0.5}$.
6. Pullout strength does not control design of indicated anchors. Do not calculate pullout strength for indicated anchor size and embedment.
7. Anchors are permitted to be used in sand-lightweight concrete provided that the modification factor λ_a (ACI 318-11) or λ (ACI 318-08) for concrete breakout strength is taken as 0.6 in lieu of ACI 318-11 D.3.6 (2012 IBC) or ACI 318-08 D.3.4 (2009 IBC). In addition, the pullout strength $N_{p,cr}$, $N_{p,eq}$, $N_{p,uncr}$ must be multiplied by 0.6, as applicable. For ACI 318-05, the values N_b, $N_{p,eq}$, $N_{p,cr}$, $N_{p,uncr}$ and V_b must be multiplied by 0.6.
8. Tabulated values for characteristic pullout strength in tension are for seismic applications and based on test results per ACI 355.2 Section 9.5.
9. The notation in brackets is for the 2006 IBC.

SECTION C

ASSEMBLY & DISASSEMBLY INSTRUCTIONS

PIPE SKIMMERS (Lever Operated)

ASSEMBLY & DISASSEMBLY INSTRUCTIONS FOR SERVICE & REPAIR

TO REPLACE RING SEALS

SEE INSTRUCTION SHEET 1M-12-106 & 1M-12-107.

1. Loosen the collars setscrews that retain the seals.

2. Slide collar back on pipe. Pull seal from groove, cut seal and discard.

3. Replace seal with a Buna-N material with ends cut square. Wrap around outside of pipe (curved surface against pipe) between collar and wall bearing, trim to length (approximately 43" long) and fasten ends with adhesive (Loctite #46551 or equal). Smear seal and groove with waterproof grease. Slide new seal into groove making sure that the joint connection is at top of bearing (above water level).

4. Slide collar up against seal and tighten the setscrews to get a light compression of the seal around the pipe.

SECTION D

TROUBLESHOOTING GUIDE

LEVER OPERATED PIPE SKIMMERS

TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	CORRECTIVE ACTION
Pipe won't rotate.	Floating debris preventing pipe rotation.	Remove as required.
	Misalignment has occurred.	Realign per "Installation Instructions".
	Seals compressed too tightly.	Back off clamp collars as required.
	Foreign material has entered bearing and seal and closed the normal operating tolerances.	Remove and clean material from bearing and seal. Smear with grease.
Leaking.	Seal has been damaged.	Replace.
	Scum pipe has been damaged.	Repair as required.
	Concrete or seal behind wall bearing has deteriorated.	Repair or replace as required.

SECTION E

SPARE PARTS INFORMATION

AMWELL®
A Division of McNish Corporation
Aurora, Illinois, USA

Issued 2/5/87
Supersedes NONE

ALL EQUIPMENT

PROCEDURE FOR ORDERING SPARE OR REPAIR PARTS

1. Identify your equipment using the **AMWELL** S.O. number shown below.

2. Identify the part by name and give the number of the drawing on which this part or assembly appears. If it is a part for a motor, pump, electrical control or any other part not manufactured by **AMWELL**, the information will be found in the manufacturer's reference data included in this manual, or on the manufacturer's nameplate.

3. Show the part number. (Information can be gained in the same manner).

4. Show the size and include all pertinent dimensions (such as diameter, length, thickness, bore, pitch, etc.) whenever possible.

5. If parts being ordered are electrical in nature, give all pertinent data; voltage, amperage, wattage, hertz, speed, power factor or other information given on a nameplate or in the brochure.

6. Submit your written purchase order or request for quotation, both signing and printing your full name so that we will know whom to contact should further clarification of the order be necessary. All verbal orders must be confirmed in writing.

7. Give return and shipping address.

8. Give preferred method of shipping: Parcel Post, Truck Freight, Rail Freight, Air Express, etc.

9. Show quantity desired.

10. Give instructions on where to send invoice.

11. All spare or repair part orders are subject to a minimum order charge.

12. Send all inquires to: **AMWELL**, A Division of McNish Corporation
161 S. Lincolnway St., Suite 310, North Aurora, IL 60542
Phone: (630) 898-6900 / Fax: (630) 898-6901

YOUR EQUIPMENT IS IDENTIFIED AS FOLLOWS:

S.O. NUMBER:	NAME OF EQUIPMENT:
A22140-12	Two (2) Model "PSL" Pipe Skimmers Mechanisms

PIPE SKIMMERS

RECOMMENDED SPARE PARTS LIST

RECOMMENDED SPARE PARTS LIST		
QUANTITY	ITEM	IDENTIFICATION NO.
One (1)	Set of Seals per Skimmer	

FURNISHED SPARE PARTS LIST		
QUANTITY	ITEM	IDENTIFICATION NO.
	NONE	

PRICES QUOTED UPON REQUEST.

SECTION F

SPECIFICATIONS &
GENERAL ARRANGEMENT
DRAWING

EQUIPMENT SPECIFICATIONS

APPROVAL SPECIFICATIONS
FOR
MODEL "PSL" LEVER OPERATED SKIMMERS

Project ..... Waste Water Treatment Plant – Phase 1
Taunton, MA

Date ..... November 8, 2021

General Arrangement Drawing D211-84994-768

Number of Units ..... Two (2)

Size ..... 10" diameter x 12'-0" long

EACH UNIT SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

Pipe..... One (1) 10" diameter SCH 20 (0.250" wall) 316 stainless steel pipe and shall be complete with opening slots cut on a 60° angle as measured on the chord of the arc in 30" intervals with 2" wide stiffening bands. Pipe when tipped shall receive the floating debris.

Wall Bearings..... The open end of the skimmer pipe shall be supported by fabricated 316 stainless steel wall bearing. The wall bearing shall have oversized holes to assist alignment. Each bearing end to have a virgin UHMW-PE bearing bar which assists in the turning of the skimmer pipe. Both ends of the pipe skimmer shall have end bearings unless one (1) end is closed. Bearings with renewable seals and neoprene wall fillers.

End Bracket ..... The closed end of the skimmer pipe shall be supported with an end bracket if the end of the pipe is closed. The end brackets shall be made of fabricated 316 stainless steel with oversized holes to assist alignment. The brackets shall also have a virgin UHMW-PE wear pad fastened to the surfaces contacted by the pipe to aid in turning.

Seal ..... A 1” wide Buna-N seal is provided to keep debris out of the bearing area. The seal is not affected by grease, mild acids or alkalis and is easily replaceable without removing the skimmer pipe from the wall bearing.

Operating Lever ..... Each skimmer pipe shall be provided with a handle of a length suitable for turning the skimmer pipe from the operating floor. The handle shall be 1 1/2” SCH40 316 stainless steel pipe with capped end.

Anchor Bolts ..... One (1) lot of 316 stainless steel anchor bolts, nuts and washers necessary for the equipment furnished.

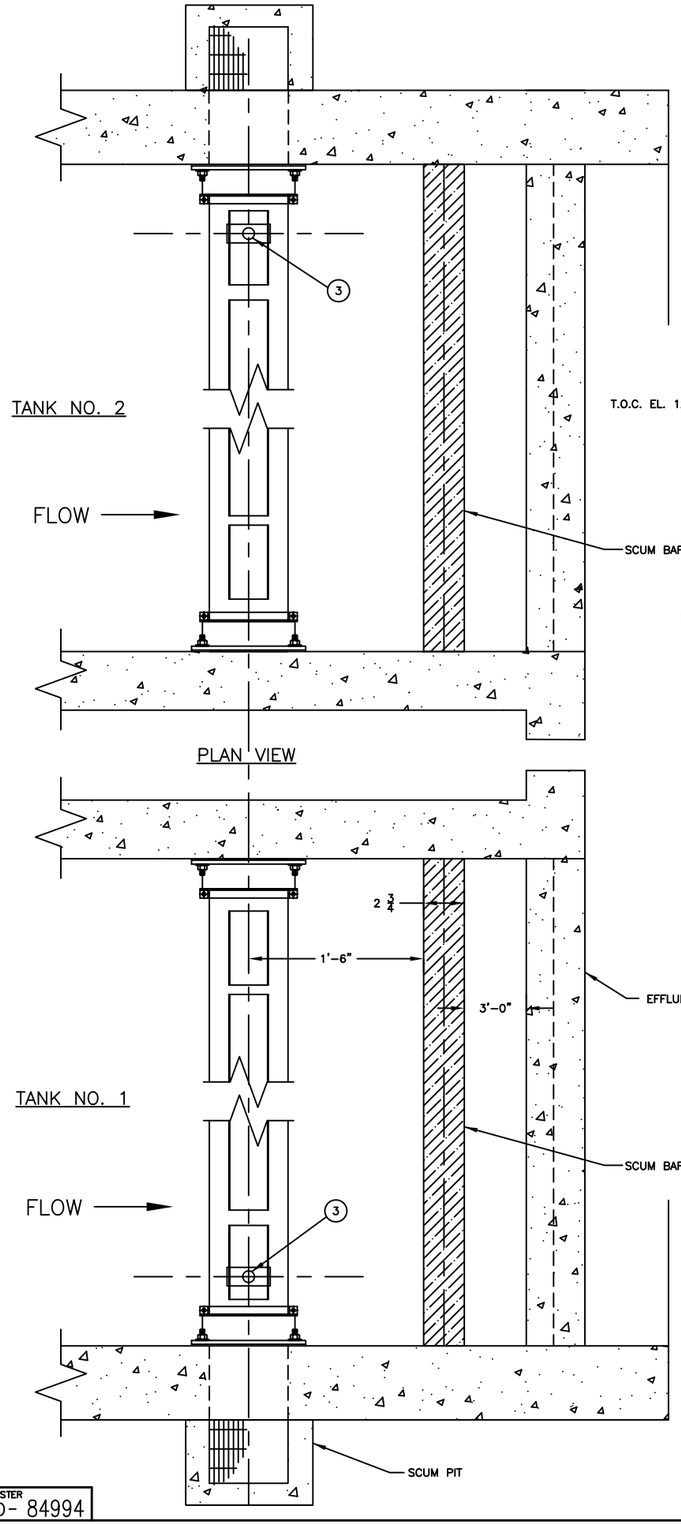
Painting ..... All stainless steel surfaces shall be acid passivated after welding for corrosion resistance and to provide a superior surface finish by full dipping of weldments; or by using an acid passivation paste in the weld and heat affected areas and spray-on acid solutions elsewhere. After passivation, the weldments shall be thoroughly rinsed with clean water and allowed to air dry. Reference ASTM Standards A380-06 and A967-05EL.

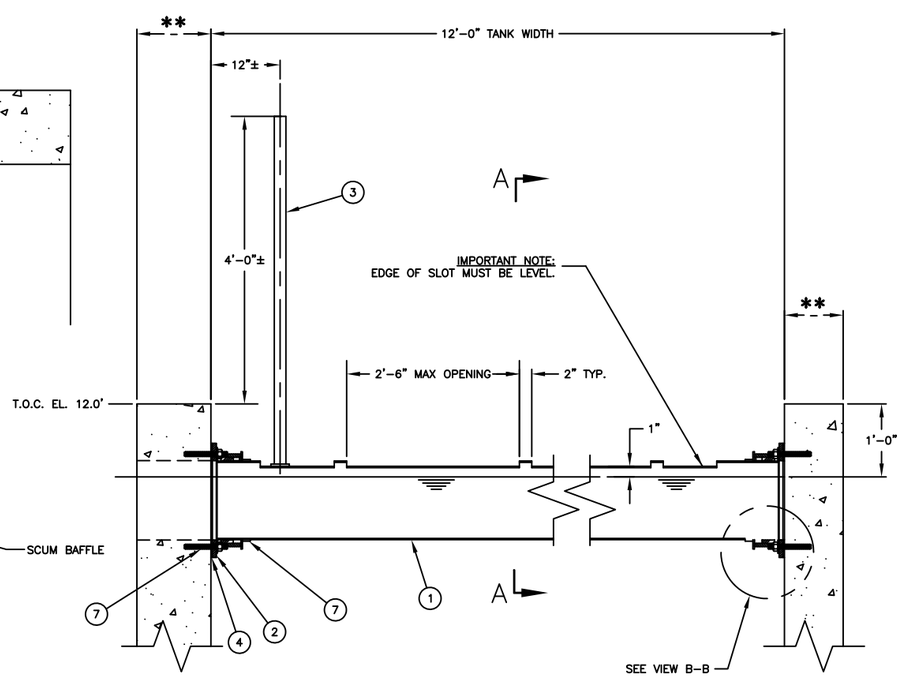
Spare Parts ..... Furnish one (1) set of seals per skimmer.

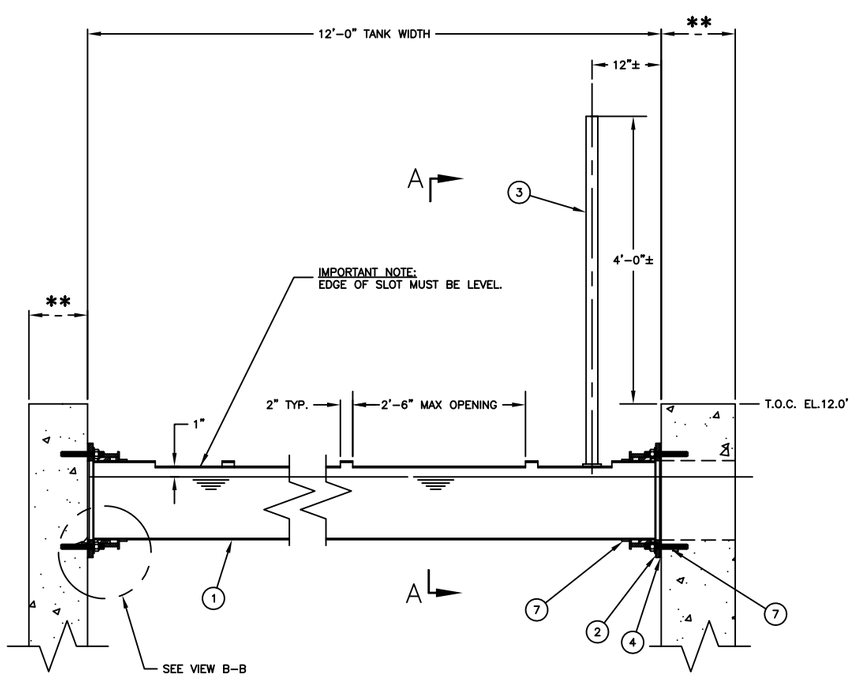
THE FOLLOWING ITEMS ARE NOT FURNISHED BY AMWELL:

Lubricating oils or grease, grease or grease lines, field painting or welding, unloading storage, concrete work, handrail, wall sleeves, connecting elbows or anything not specifically mentioned above.

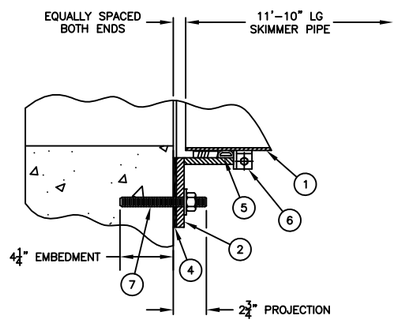
GENERAL ARRANGEMENT DRAWING



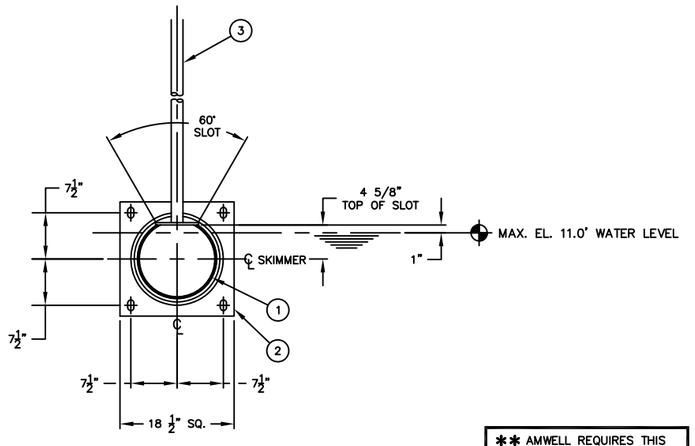




ELEVATION



VIEW B-B



SECTION A-A

NOMENCLATURE

1. SKIMMER PIPE
2. WALL BEARING W/UHMW WEARING BAR
3. 1 1/2" DIA. PIPE OPERATING LEVER
4. GASKET
5. BUNA D SEAL – TYPICAL
6. CLAMP COLLAR
7. 3/4" X 7" LG. 316 S.S. EXPANSION ANCHORS DRILL 3/4" DIA. HOLES X 4 1/2" DEEP (4) PER WALL BEARING

** AMWELL REQUIRES THIS ELEVATION OR DIMENSION

AMWELL REQUIRES ALL TANK DIMENSIONS & ELEVATIONS BE CONFIRMED OR REVISED

PROJECT:
TAUNTON WASTEWATER TREATMENT FACILIY IMPROVEMENTS
TAUNTON, MASSACHUSETTS

MICROFILMED

AMWELL
A Division of McNish Corporation
AURORA, ILLINOIS, USA
(ORIGINALLY AMERICAN WELL WORKS – EST. 1868)

SYM	REVISION	BY	DATE	CHKD
D				
C				
B				
A				

AMWELL FURNISHES MECHANISM TO FIT TANK OF DIMENSIONS GIVEN, BUT IS NOT RESPONSIBLE FOR CONCRETE DESIGN. CUSTOMER TO FURNISH NECESSARY REINFORCING STEEL AND TO DETERMINE SIZE AND PLACEMENT OF FOOTINGS TO SUIT LOCAL CONDITIONS.

AMWELL DOES NOT FURNISH PIPING (EXCEPT AS NOTED) FLOOR RAILS, TROUGHS, GRATINGS, WEIR PLATES, OIL OR GREASE FOR LUBRICATION, ANY WIRING OR CONDUITS BETWEEN MOTORS, CONTROLS AND ALARMS OR ANY ELECTRICAL EQUIPMENT OF ANY KIND EXCEPT AS SPECIFICALLY STATED IN AMWELL SPECIFICATIONS.

DRAWN	PSP
CHECKED	
APP'D.	
DATE	11-03-21
S.O.	A22140-12
SCALE	NONE

DESCRIPTION: GENERAL ARRANGEMENT MODEL 'PSL' 10" PIPE SKIMMER

DRAWING NO. D,2,1,1|8,4,9,9,4|7,6,8| REV.

MASTER D- 84994

CAD FILE: D84994 PLOT SCALE = 0.0833