Submittal Transmittal

Aquatic Center Package No: 13 0000-0001-0
Date: 05/21/2009

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Transmitted To:
Jim Raver
LPA, Inc
1548 Eureka Road
Suite 101
Roseville, CA 95661
Phone: (916) 772-4300 Fax: (916) 772-4330

Status Submitted
Date Due 06/04/2009

Description

Swimming Pool Submittal, Western Water Features

Notes

Please note that items listed on the room data sheets are not submitted herein and will be submitted upon resolution of the FFE package.

In reviewing this submittal package pay particular attention to the subsections specified on the submittal approval pages.

Please also note:
-On-site soil is to be used as a fill material.
-Tile samples indicate conformance with product data. Manufactuer listed in spec and on sample is consistant.

Item #	Type	Description	Spec Sec	Sub Sec	Rev	Comments	Status
775	Certifications	Qualifications Specified in 1.3.A of this Section	13 1101	1.4.C, 2.1	0		In Review
778	Product Data	Swimming Pool Concrete	13 1102	2.3	0		In Review
780	Product Data	Shotcrete	13 1103	2.1	0		In Review
781	Samples	Pool Ceramic Tile	13 1104	2.1	0		In Review
783	Product Data	Ceramic Tile Mortar and Grout	13 1104	2.2, 2.3, 2.4	0		In Review
784	Product Data	Pool Plaster and Waterproofing	13 1105	2.1-2.5	0		In Review
785	Product Data	Pool Equipment	13 1106	2.3, 2.4, 2.5-2.13	0		In Review
786	Product Data	Pool Mechanical	13 1107	2.3A-2.3G, 2.4-2.6	0		In Review

Transmitted By: Tom Dixon

Received By: _____ _____ ____/____/_____
Signature Print Name Date

Copies To

Company	Contact

WESTERN WATER FEATURES

commercial aquatic construction

5088 Hillsdale Circle
El Dorado Hills, CA 95762

Submittals For:
College of San Mateo
3401 CSM Drive
San Mateo, CA 94402

Submittals To:
LPA, INC.
1548 Eureka Road, Suite 101
Roseville, CA 95661

WESTERN WATER FEATURES
commercial aquatic construction
5088 Hillsdale Circle
El Dorado Hills, CA 95762

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval				McCarthy Approval
Spec Section	**Sub Section**	**Item No**	**Revision**	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements.
13 1101	1.4.C, 2.1	775	0	By: Tom Dixon Date: 05/21/2009
Qualifications Specified in 1.3.A of this Section				Submittal Package No: 13 0000-0001-0
Approved for Submission				Swimming Pool Submittal, Western Water Features
By: Michael Leja				
Western Water Features, Inc.				

LPA, Inc Approval	Engineer Approval
1548 Eureka Road Suite 101 Roseville, CA 95661	

WESTERN WATER FEATURES, INC.
Commercial Aquatic Design & Construction

5088 Hillsdale Circle, El Dorado Hills, CA 95762
Phone: (916) 939-1600 Fax: (916) 939-1671

June 12, 2008

To Whom It May Concern:

Western Water Features, Inc's swimming pool excavation plan consists of following the CAL OSHA and Federal OSHA Swimming Pool Excavation Guidelines (see attached).

Swimming Pools are excluded from "Typical" Trench Excavation Requirements required by those agencies, given the specific characteristics of swimming pool construction.

Western Water Features will have a knowledgeable and competent Foreman on site to direct all excavation work as required by OSHA.

Laura L Parkes

Sec. of Corporation

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval				McCarthy Approval
Spec Section	**Sub Section**	**Item No**	**Revision**	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements.
13 1102	2.3	778	0	By: Tom Dixon Date: 05/21/2009
Swimming Pool Concrete				Submittal Package No: 13 0000-0001-0
Approved for Submission				Swimming Pool Submittal, Western Water Features
By: Michael Leja				
Western Water Features, Inc.				

LPA, Inc Approval	Engineer Approval
1548 Eureka Road Suite 101 Roseville, CA 95661	

Supplier: CEMEX

Customer: JW Gunite
Attention: Rafael

Date Issued: 3/23/2009

Project: San Mateo Swimming Pool
Submittal #: 17583

Plant: 4435
San Carlos

Mix #: 1412569 Description: 4CR 564 C+F 15% WR
Use: Cast in Place

Material	Source	Description	ASTM	Specific Gravity	oz/yd	Weight (lb)	Volume
Type II-V	Type II/V	Cemex	C-150	3.15		479.0	2.44
Fly Ash F	Bridger	Headwaters Resources	C-618	2.35		85.0	0.58
Fine Aggregate	Orca Concrete San	Polaris Minerals Corp.	C-33	2.78		1591.0	9.17
Type A Water Reducer	Wrda 64	Grace	C-494	1.00	19		0.00
City	Water		C-94	1.00	35.0 gal	292.1	4.68
Aggregate	Orca 1"x#4	Polaris Minerals Corp.	C-33	2.88		1750.0	9.73
Air							0.41
					TOTAL	4197	27.00

Specified F'c :	3,000 PSI	Designed Wet Unit Weight:	155.4 lbs./cu.ft.
Specified Slump:	4.00 in.	Designed W/C + P Ratio:	0.52
Specified Air:	1.50 %	Designed Volume:	27.00 cu.ft.

CEMEX has no knowledge or authority regarding where this concrete mix is to be placed or its intended application. It is the sole responsibility of the Customer, to ensure that the mix parameters of compressive strength, water cement ratio, cement content, and air content, are appropriate for the environmental conditions at the project site.

The Customer acknowledges and confirms that this information is confidential and is being disclosed to the recipient for purposes of review only. By accepting this information, the recipient agrees:

- to maintain this information in confidence at all times,
- to not disclose this information, in whole or in part, by way of summary or analysis, to anyone except as explicitly agreed to by Cemex.

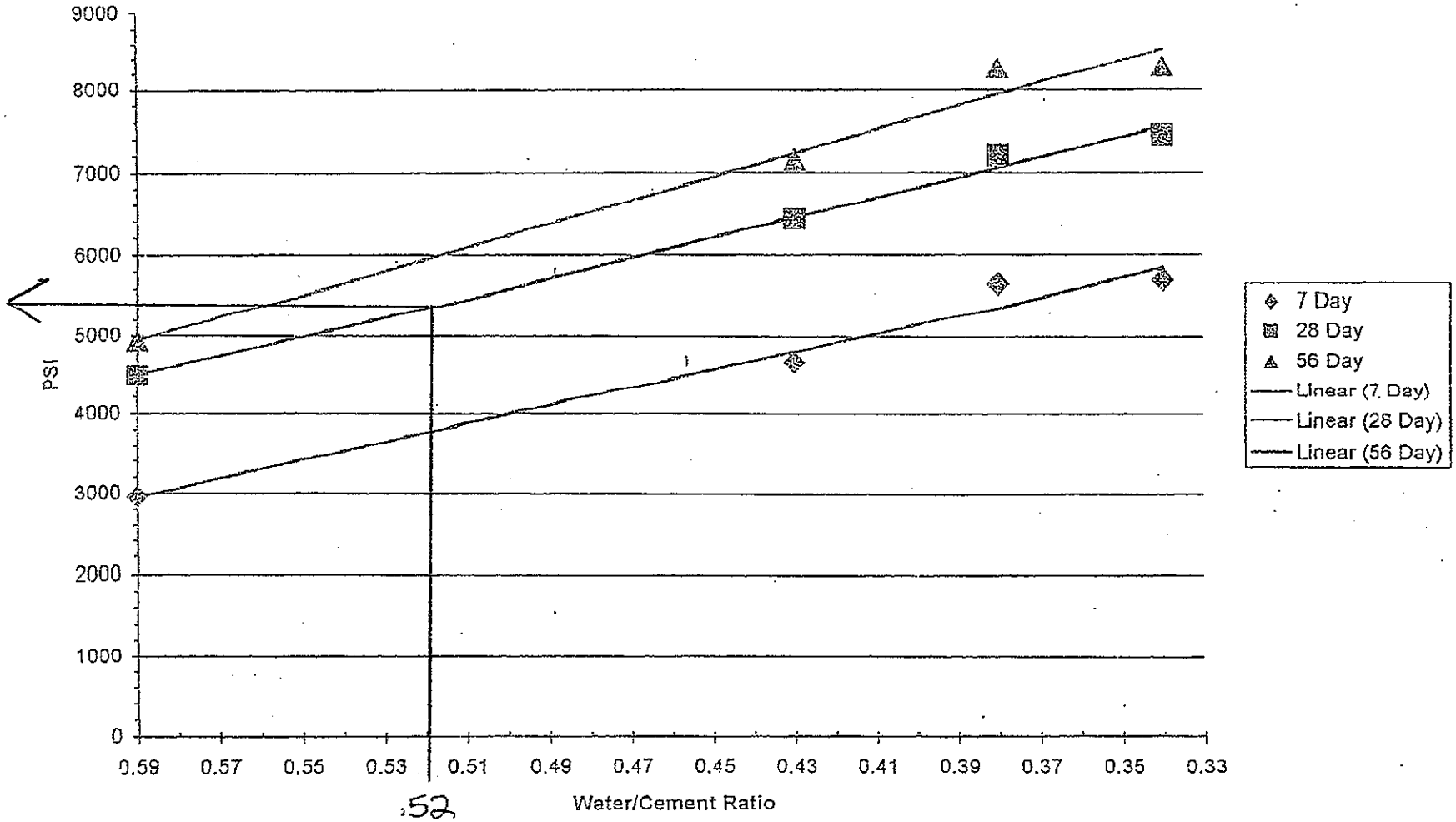
COMMENTS:
* Please have your pumping company verify pumpability
* Please send compressive strength results to Cemex for statistical analysis.

Marla Woodard
Quality Specialist

5 5 5

Mix 1412569

4P C+F 1"wrOrca & Orca Sand Curve (LP7014AI-AK) - 042207



.52

w/c

Ratio

4750 Norris Canyon Rd. Suite A
San Ramon, Ca. 94583
(925) 866-2983 Fax
(925(866-2780 Phone

Technical Services
Trial Batch Compression Test Report

Job Name: Strength Curve San Francisco
Customer: Various
Sales Person: Various

Mix Data

Batch Date:	4/2/2007	Mix #	7014AI
Lab I.D.:	809	Specified Strength:	3000 PSI
Total Sets:	4	Cement Factor:	5
Aggregate Description:	Orca 1"x#4	Fly Ash %:	15
Fine Agg. Description:	Orca Sand	Specified Slump:	4
Admixtures:	WRDA 64	Specified Air%:	2
Mix Description:	4P 470lb C+F Orca Wr	Time of Batching:	9:25am

Batching Data

Set Number:	1 of 4	Slump:	3.75
Technician:	Tom F	Ambient Temp:	62°F
Cylinder Size:	4" x 8"	Concrete Temp:	64°F
# of Cylinders :	9	Shrinkage ?:	Yes
W/C Ratio:	0.59	Air Content:	2

Compression Data

Cylinder Number	Test Age in Days	Test Date	Cure Type	Cylinder Size	Square Area	Maximum Load	Strength in PSI	Average PSI	Fracture Type
1	7	4/9/07	L	4x8	12.56	37050	2948		A
2	7	4/9/07	L	4x8	12.56	37830	3011		A
3	7	4/9/07	L	4x8	12.56	36,880	2935	2960	A
4	28	4/30/07	L	4x8	12.56	56050	4460		A
5	28	4/30/07	L	4x8	12.56	57830	4602		A
6	28	4/30/07	L	4x8	12.56	55540	4412	4490	A
7	56	5/28/07	L	4x8	12.56	60600	4825		A
8	56	5/28/07	L	4x8	12.56	61670	4910		A
9	56	5/28/07	L	4x8	12.56	63250	5060	4930	A

Curing Type: L = Lab, F = Field
Fracture: A = Cone and columnar, B = Columnar, C = Diagonal, D = Side, E = Double side

3990 E Concours Street
Suite 200
Ontario, CA 91764
Telephone (909) 974-5469
FAX (909) 974-5525

CEMENT MILL TEST REPORT

Cement Identified as:
Plant: Cemex California Cement LLC
Location: Victorville, CA
Production Dates:
Beginning: September 12, 2008
Ending: September 18, 2008

Date: 9/26/2008

Reference No. 39717

STANDARD CHEMICAL REQUIREMENTS (ASTM C 114)	ASTM C 150 SPECIFICATIONS	TYPE I	TYPE II	TYPE V	TEST RESULTS
Silicon Dioxide (SiO2), %	Minimum	----	----	----	21.0
Aluminum Oxide (Al2O3), %	Maximum	----	6.0	----	3.7
Ferric Oxide (Fe2O3), %	Maximum	----	6.0	----	3.4
Calcium Oxide (CaO), %		----	----	----	63.5
Magnesium Oxide (MgO), %	Maximum	6.0	6.0	6.0	4.5
Sulfur Trioxide (SO3), % **	Maximum	3.0	3.0	2.3	2.5
Loss on Ignition (LOI), %	Maximum	3.0	3.0	3.0	0.9
Insoluble Residue, %	Maximum	0.75	0.75	0.75	0.26
Alkalies (Na2O equivalent), %	Maximum	0.60	0.60	0.60	0.49
Tricalcium Silicate (C3S), %	Maximum	----	----	----	62
Dicalcium Silicate (C2S), %		----	----	----	14
Tricalcium Aluminate (C3A), %	Maximum	----	8	5	4
Tetracalcium Aluminoferrite (C4AF), %		----	----	----	10
(C3S + 4.75C3A)	Maximum		100		81
(C4AF + 2C3A) or (C4AF + C2F), %	Maximum	----	----	25	18
PHYSICAL REQUIREMENTS					
(ASTM C 204) Blaine Fineness, cm^2/gm	Minimum	2800	2800	2800	3840
(ASTM C 430) -325 Mesh, %		----	----	----	97.7
(ASTM C 191) Time of Setting (Vicat)					
Initial Set, minutes	Minimum	45	45	45	104
Final Set, minutes	Maximum	375	375	375	207
(ASTM C 451) False Set, %	Minimum	50	50	50	91
(ASTM C 185) Air Content, %	Maximum	12	12	12	7.1
(ASTM C 151) Autoclave Expansion, %	Maximum	0.80	0.80	0.80	0.14
(ASTM C 187) Normal Consistency, %		----	----	----	25.2
(ASTM C 1038) Expansion in Water %	Maximum	0.020	0.020	0.020	0.009
(ASTM C 109) Compressive Strength, psi (MPa)					
1 Day		----	----	----	2360(16.3)
3 Day	Minimum	1740(12.0)	1450(10.0)	1160(8.0)	3800(26.2)
7 Day	Minimum	2760(19.0)	2470(17.0)	2180(15.0)	4660(32.1)

*** The performance of CEMEX Type II/V has proven to be improved with sulfur trioxide levels in excess of the 2.3% limit for Type V. Note D in ASTM C-150 allows for additional sulfate, provided expansion as measured by ASTM C-1038 does not exceed 0.020%.*

CEMEX hereby certifies that this cement meets or exceeds the chemical and physical Specifications of:

ASTM C-150-07 Type I, Type II, and Type V Low Alkali portland cements
ASTM C-1157-03 Type GU Hydraulic Cement
CalTrans, Section 90-2.01 Type II Modified and Type V / Test 527

By:
Quality Control Manager
CEMEX - Victorville Cement Plant
16888 North "E" St., Victorville, CA 92394

CTL | THOMPSON

Chemical and Physical Analysis of Fly Ash

Developed For: *Headwaters Resources*
16817 - 155th Pl SE
Renton, WA 98058

Ticket: *8490*	Plant of Origin: *Bridger*	Sample Date Range: *11/10/2008*
Job: *14420*	Sample ID: *Br-108-08T*	to: *11/14/2008*
Report Date: *01/19/2009*	Docket: *10031968 - 10032084*	Date Received: *11/20/2008*

Chemical Composition (%)

(by Wyoming Analytical Laboratories, Inc.)

			ASTM C 618-08 Specifications	
			Class F	Class C
Total Silica, Aluminum, Iron:	*79.9*		70.0 Min	50.0 Min
Silicon Dioxide:		*56.1*		
Aluminum Oxide:		*19.4*		
Iron Oxide:		*4.4*		
Sulfur Trioxide:	*0.9*		5.0 Max	5.0 Max
Calcium Oxide:	*9.0*			
Moisture Content:	*0.1*		3.0 Max	3.0 Max
Loss on Ignition:	*0.4*		6.0 Max	6.0 Max
			California DOT Specifications	
Total Alkalies (as Na_2O):	*4.3*		5.0 Max	5.0 Max
Total Sodium Oxide:		*3.70*		
Total Potassium Oxide:		*0.85*		

Physical Test Results

		ASTM C 618-08 Specifications	
		Class F	Class C
Fineness, Retained on #325 Sieve (%):	*22.7*	34 Max	34 Max
Strength Activity Index (%)			
Ratio to Control @ 7 Days:	*85.2*		
Ratio to Control @ 28 Days:	*88.0*	75 Min	75 Min
Water Requirement, % of Control:	*93.4*	105 Max	105 Max
Soundness, Autoclave Expansion (%):	*0.02*	0.8 Max	0.8 Max
Drying Shrinkage, Increase @ 28 Days (%):	*0.00*	0.03 Max	0.03 Max
Density Mg/m^3:	*2.36*		

Comments:

COLORADO REGISTERED ORVILLE R. WERNER II 14640 1/19/2009 PROFESSIONAL ENGINEER

CTL | Thompson Materials Engineers, Inc.

Orville R. Werner II, P.E.

22 Lipan Street | Denver, Colorado 80223 | Telephone: 303-825-0777 Fax: 303-893-1568

Revised: June 01, 2008

ORCA WASHED GRAVEL 1" x No.4 (25.0 x 4.75mm)

The Orca concrete aggregates are produced at the Orca Quarry, Port McNeill, B.C., in a modern and efficient washing and processing plant opened in March 2007 and distributed via ocean-going ships or barges. The California Department of Transportation has established that aggregates from this source are innocuous with respect to Alkali Silica Reactivity and has approved them for use in reduced mineral admixture (flyash) concrete. The CalTrans reference number to be quoted for this gravel is 07-CAN-OQ-3.
Independent laboratory concrete trial mixes using Orca 1" x #4 gravel and Orca washed concrete sand produced results designated "Low Shrinkage" in accordance with test method ASTM C157 (Modified).

The 1" x No.4 (ASTM 57) gravel is produced through a precise computer-controlled blending system from two separate size fractions, 1" x 1/2" (25.0 x 12.5 mm) and 1/2" x No.4 (12.5 x 4.75 mm).

GRADATION – PERCENTAGE PASSING

SIEVE	ORCA GRAVEL * (Typical Values)		SPECIFICATIONS	
			CALTRANS Per: 90-3.01 (2006)	ASTM C33-03 Type 57
37.5 mm (1-1/2")	100.0		100	100
25.0 mm (1")	99		88 – 100	95 – 100
19.0 mm (3/4")	75	X = 75	60 - 90 X ± 15	
12.5 mm (1/2")	40		-	25 – 60
9.5 mm (3/8")	24	X = 25	10 - 40 X ± 15	
4.75 mm (#4)	<1		0 - 16	0 - 10
2.36 mm (#8)	<1		0 - 6	0 - 5

* Blend Ratio: 65% of 1" x 1/2" (25.0 x 12.5 mm) with 35% of 1/2" x No.4 (12.5 x 4.75 mm).

PROPERTIES

	TEST	ORCA	SPECIFICATIONS	
			CALTRANS	ASTM
Specific Gravity, bulk SSD	CT 206	2.88		
Absorption	CT 206	0.5		
Dry Rodded Unit Weight, pcf	CT 212	115		
Cleanness Value	CT 227	>80	75 Min.	
Durability	CT 229	90		
Sodium Sulfate Soundness	C-214	<1%	10% Max.	12% Max.
Magnesium Sulfate Soundness	C-88	<1%		18% Max.
Los Angeles Abrasion (500 Revs)	C-535	5%	45% Max.	50% Max.
Materials Finer Than No. 200	C-117	<0.5%		1.0% Max.
Alkali Silica Reactivity	C-1260	0.01% Innocuous		0.10%

Herb G. A. Wilson, Chief Operating Officer.

Orca Sand & Gravel Ltd. • 6505 Island Highway • Port McNeill • BC • V0N 2R0
Telephone: (604) 628-3353 Facsimile: (604) 628-3554

Orca SAND & GRAVEL LTD.

Revised: June 01, 2008.

ORCA WASHED CONCRETE SAND

The Orca concrete aggregates are produced at the Orca Quarry, Port McNeill, B.C., in a modern and efficient washing and processing plant opened in March 2007 and distributed via ocean-going ships or barges. The California Department of Transportation has established that aggregates from this source are innocuous with respect to Alkali Silica Reactivity and has approved them for use in reduced mineral admixture (flyash) concrete. The CalTrans reference number to be quoted for this sand is 07-CAN-OQ-1.
Independent laboratory concrete trial mixes using Orca 1" x #4 gravel and Orca washed concrete sand produced results designated "Low Shrinkage" in accordance with test method ASTM C157 (Modified).

GRADATION – PERCENTAGE PASSING

SIEVE SIZE		ORCA SAND (Typical Values)		SPECIFICATIONS		
				CALTRANS Per: 90-3.01 (2006)		ASTM C 33-03
9.50 mm (3/8")		100.0		100		100
4.75 mm (#4)		99		95 – 100		95 – 100
2.36 mm (#8)		81		65 – 95		80 – 100
1.18 mm (#16)	"A"	68	X = 68	58 – 78	X ± 10	50 – 85
600 µm (#30)	"B"	49	X = 46	37 – 55	X ± 9	25 – 60
300 µm (#50)	"C"	25	X = 26	20 – 32	X ± 6	5 – 30
150 µm (#100)		6		2 – 12		0 – 10
75 µm (#200)		<2		0 – 8		0 – 3
	A – B	19		10 – 40		
	B – C	24		10 – 40		
Fineness Modulus		2.65 – 2.85				2.3 – 3.1

PROPERTIES

	TEST	ORCA	SPECIFICATIONS	
			CALTRANS	ASTM
Specific Gravity, bulk SSD	CT 206	2.78		
Absorption	CT 206	0.5		
Dry Rodded Unit Weight, pcf	CT 212	115		
Sand Equivalent	CT 217	85	75 Min.	
Durability	CT 229	80		
Sodium Sulfate Soundness	C-214	<2%	10% Max.	10% Max.
Magnesium Sulfate Soundness	C-88	<1%		15% Max.
Relative Mortar Strength	C-87	110%	95% Min.	
Materials Finer Than No. 200	C-117	<2%	8% Max.	3% Max.
Alkali Silica Reactivity	C-1260	0.01% Innocuous		0.10%

Herb G. A. Wilson, Chief Operating Officer.

Orca Sand & Gravel Ltd. • 6505 Island Highway • Port McNeill • BC • V0N 2R0
Telephone: (604) 628-3353 Facsimile: (604) 628 3354

Grace Construction Products

W.R. Grace & Co. – Conn.
293 Wright Brothers Avenue
Livermore, CA 94550

T 925-443-9700

www.graceconstruction.com

8/28/2008

Erick Francisco
Cemex
4750-A Norris Canyon Rd.
San Ramon, California 94583

Project Name: Product Information
Product Selected: WRDA® 64

This is to certify that the WRDA 64, a Water Reducer, as manufactured and supplied by Grace Construction Products, W.R. Grace & Co. – Conn., is formulated to comply with the Specifications for Chemical Admixtures for Concrete, ASTM: C494, Type A, D, AASHTO: M194, Type A, D.

WRDA 64 does not contain calcium chloride or chloride containing compounds as a functional ingredient. Chloride ions may be present in trace amounts contributed from the process water used in manufacturing.

The foregoing is in addition to and not in substitution for our standard Conditions of Sale attached.

Mike Gardner
Western Region Technical Services Manager

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval				McCarthy Approval
Spec Section	**Sub Section**	**Item No**	**Revision**	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements.
13 1103	2.1	780	0	By: Tom Dixon Date: 05/21/2009
Shotcrete				Submittal Package No: 13 0000-0001-0
Approved for Submission				Swimming Pool Submittal, Western Water Features
By: Michael Leja				
Western Water Features, Inc.				

LPA, Inc Approval	Engineer Approval
1548 Eureka Road Suite 101 Roseville, CA 95661	

Supplier: CEMEX

Customer: JW Gunite
Attention: Rafael

Date Issued: 3/23/2009

Project: San Mateo Swimming Pool
Submittal #: 17583

Plant: 4435
San Carlos

Mix #: 1413066 Description: Shot 705Lb C+F Wr
Use: Shotcrete

Material	Source	Description	ASTM	Specific Gravity	oz/yd	Weight (lb)	Volume
Type II-V	Type II/V	Cemex	C-150	3.15		599.0	3.05
Fly Ash F	Bridger	Headwaters Resources	C-618	2.35		106.0	0.72
# 7	Orca 1/2"x#4	Polaris Minerals Corp.	C-33	2.89		821.0	4.55
Fine Aggregate	Orca Concrete San	Polaris Minerals Corp.	C-33	2.78		2196.9	12.66
Type A Water Reducer	Wrda 64	Grace	C-494	1.00	24		0.00
City	Water		C-94	1.00	40.0gal	333.8	5.35
Air							0.68
					TOTAL	4057	27.00

Specified F'c :	4,000 PSI	Designed Wet Unit Weight:	150.2 lbs./cu.ft.
Specified Slump:	2.00 in.	Designed W/C + P Ratio:	0.47
Specified Air:	2.50 %	Designed Volume:	27.00 cu.ft.

CEMEX has no knowledge or authority regarding where this concrete mix is to be placed or its intended application. It is the sole responsibility of the Customer, to ensure that the mix parameters of compressive strength, water cement ratio, cement content, and air content, are appropriate for the environmental conditions at the project site.

The Customer acknowledges and confirms that this information is confidential and is being disclosed to the recipient for purposes of review only. By accepting this information, the recipient agrees:

- to maintain this information in confidence at all times,
- to not disclose this information, in whole or in part, by way of summary or analysis, to anyone except as explicitly agreed to by Cemex.

COMMENTS:

* Cores should be corrected (f'c/.85) as per U.B.C. & C.B.C. Section 1922A.10.
* Minimum 3" diameter cores and 18" x 18" panels should be used for aggregates >3/8" per U.B.C. & C.B.C. Section 122.
* Please send compressive strength results to Cemex for statistical analysis.
* Shotcrete contractor must verify the pumpability of this mix design.

Marla Woodard
Quality Specialist

SHOTCRETE

CEMEX

Backup Data Sheet For Mix #: 1413066

Date: 3/23/2009 Units : US

STRENGTH SUMMARY, Compression Either 4" x 8" Or 6" x 12"

No. Of Tests	Avg Slump	Strengths Avg 7 Day	Avg 28 Day	Avg Acc Age	Accept Age	Std Dev	ACI318 Req'd
30	2.23	4660	5640	5640	28	560	4810

DETAILED STRENGTH, Compression Either 4" x 8" Or 6" x 12"

Mix Number	Batch Number	Date	Plant	Slump	Strengths 7 Day	28 Day	Acc Age	Acc Age
1413066	9012264	6/7/2003	815-idl	2.00		6230	6230	28
1413066	9012267	6/7/2003	815-idl	2.00		6440	6440	28
1413066	13150827	6/10/2003	4436	2.00		6100	6100	28
1413066	9012564	6/20/2003	815-idl	2.50		5140	5140	28
1413066	9012662	6/24/2003	815-idl	2.00		5020	5020	28
1413066	201-C0316	6/25/2003	821-idl			5260	5260	28
1413066	201-C0316	6/25/2003	821-idl			6080	6080	28
1413066	9013023	7/15/2003	815-idl	2.00		5820	5820	28
1413066	9016051	7/16/2003	815-idl	2.00		5730	5730	28
1413066	9013074	7/17/2003	815-idl	2.00		5890	5890	28
1413066	7049093	7/21/2003	4435	3.00		5250	5250	28
1413066	9013184	7/29/2003	815-idl	2.00		5520	5520	28
1413066	9013308	8/4/2003	815-idl	2.00		5090	5090	28
1413066	7049656	8/9/2003	4435	2.00		5770	5770	28
1413066	7049690	8/10/2003	4435	2.00		4770	4770	28
1413066	7049936	8/15/2003	4435	2.00		4990	4990	28
1413066	7049900	8/15/2003	4435	2.00		4640	4640	28
1413066	20115412	12/10/2003	821-idl	2.50	4130	5690	5690	28
1413066	7053600	1/6/2004	4435	2.50	5100	5640	5640	28
1413066	82809314	3/12/2007	4433	2.00	5410	5510	5510	28
1413066	82809277	3/12/2007	4433	2.00	5620	5580	5580	28
1413066	82520248	3/6/2008	4437	3.00	3980	5540	5540	28
1413066	82525218	6/18/2008	4437	2.50	4320	5780	5780	28
1413066	82525166B	6/18/2008	4437	2.50	5990	7130	7130	28
1413066	82525166A	6/26/2008	4437	2.50	3940	5710	5710	28
1413066	82525166	6/26/2008	4437	2.50	4940	6680	6680	28
1413066	82525959	7/7/2008	4437	2.50	3520	4740	4740	28
1413066	82525944	7/7/2008	4437	2.50	4150	5170	5170	28
1413066	82219532	7/15/2008	4436	2.50	4260	6180	6180	28
1413066	82219873	7/25/2008	4436	1.50	5250	6130	6130	28

3990 E Concours Street
Suite 200
Ontario, CA 91764
Telephone (909) 974-5469
FAX (909) 974-5525

CEMENT MILL TEST REPORT

Cement Identified as:
Plant: Cemex California Cement LLC
Location: Victorville, CA
Production Dates:
Beginning: September 12, 2008
Ending: September 18, 2008

Date: 9/26/2008

Reference No. 39717

STANDARD CHEMICAL REQUIREMENTS (ASTM C 114)	ASTM C 150 SPECIFICATIONS	TYPE I	TYPE II	TYPE V	TEST RESULTS
Silicon Dioxide (SiO2), %	Minimum	----	----	----	21.0
Aluminum Oxide (Al2O3), %	Maximum	----	6.0	----	3.7
Ferric Oxide (Fe2O3), %	Maximum	----	6.0	----	3.4
Calcium Oxide (CaO), %		----	----	----	63.5
Magnesium Oxide (MgO), %	Maximum	6.0	6.0	6.0	4.5
Sulfur Trioxide (SO3), % **	Maximum	3.0	3.0	2.3	2.5
Loss on Ignition (LOI), %	Maximum	3.0	3.0	3.0	0.9
Insoluble Residue, %	Maximum	0.75	0.75	0.75	0.26
Alkalies (Na2O equivalent), %	Maximum	0.60	0.60	0.60	0.49
Tricalcium Silicate (C3S), %	Maximum	----	----	----	62
Dicalcium Silicate (C2S), %		----	----	----	14
Tricalcium Aluminate (C3A), %	Maximum	----	8	5	4
Tetracalcium Aluminoferrite (C4AF), %		----	----	----	10
(C3S + 4.75C3A)	Maximum		100		81
(C4AF + 2C3A) or (C4AF + C2F), %	Maximum	----	----	25	18
PHYSICAL REQUIREMENTS					
(ASTM C 204) Blaine Fineness, cm^2/gm	Minimum	2800	2800	2800	3840
(ASTM C 430) -325 Mesh, %		----	----	----	97.7
(ASTM C 191) Time of Setting (Vicat)					
Initial Set, minutes	Minimum	45	45	45	104
Final Set, minutes	Maximum	375	375	375	207
(ASTM C 451) False Set, %	Minimum	50	50	50	91
(ASTM C 185) Air Content, %	Maximum	12	12	12	7.1
(ASTM C 151) Autoclave Expansion, %	Maximum	0.80	0.80	0.80	0.14
(ASTM C 187) Normal Consistency, %		----	----	----	25.2
(ASTM C 1038) Expansion in Water %	Maximum	0.020	0.020	0.020	0.009
(ASTM C 109) Compressive Strength, psi (MPa)					
1 Day		----	----	----	2360(16.3)
3 Day	Minimum	1740(12.0)	1450(10.0)	1160(8.0)	3800(26.2)
7 Day	Minimum	2760(19.0)	2470(17.0)	2180(15.0)	4660(32.1)

*** The performance of CEMEX Type II/V has proven to be improved with sulfur trioxide levels in excess of the 2.3% limit for Type V. Note D in ASTM C-150 allows for additional sulfate, provided expansion as measured by ASTM C-1038 does not exceed 0.020%.*

CEMEX hereby certifies that this cement meets or exceeds the chemical and physical Specifications of:

ASTM C-150-07 Type I, Type II, and Type V Low Alkali portland cements
ASTM C-1157-03 Type GU Hydraulic Cement
CalTrans, Section 90-2.01 Type II Modified and Type V / Test 527

By:
Quality Control Manager
CEMEX - Victorville Cement Plant
16888 North "E" St., Victorville, CA 92394

CTL | THOMPSON

Chemical and Physical Analysis of Fly Ash

Developed For: *Headwaters Resources*
16817 - 155th Pl SE
Renton, WA 98058

Ticket: *8490*	Plant of Origin: *Bridger*	Sample Date Range: *11/10/2008*
Job: *14420*	Sample ID: *Br-108-08T*	to: *11/14/2008*
Report Date: *01/19/2009*	Docket: *10031968 - 10032084*	Date Received: *11/20/2008*

Chemical Composition (%)

(by Wyoming Analytical Laboratories, Inc.)

			ASTM C 618-08 Specifications	
			Class F	Class C
Total Silica, Aluminum, Iron:	*79.9*		70.0 Min	50.0 Min
Silicon Dioxide:		*56.1*		
Aluminum Oxide:		*19.4*		
Iron Oxide:		*4.4*		
Sulfur Trioxide:	*0.9*		5.0 Max	5.0 Max
Calcium Oxide:	*9.0*			
Moisture Content:	*0.1*		3.0 Max	3.0 Max
Loss on Ignition:	*0.4*		6.0 Max	6.0 Max
			California DOT Specifications	
Total Alkalies (as Na_2O):	*4.3*		5.0 Max	5.0 Max
Total Sodium Oxide:		*3.70*		
Total Potassium Oxide:		*0.85*		

Physical Test Results

		ASTM C 618-08 Specifications	
		Class F	Class C
Fineness, Retained on #325 Sieve (%):	*22.7*	34 Max	34 Max
Strength Activity Index (%)			
Ratio to Control @ 7 Days:	*85.2*		
Ratio to Control @ 28 Days:	*88.0*	75 Min	75 Min
Water Requirement, % of Control:	*93.4*	105 Max	105 Max
Soundness, Autoclave Expansion (%):	*0.02*	0.8 Max	0.8 Max
Drying Shrinkage, Increase @ 28 Days (%):	*0.00*	0.03 Max	0.03 Max
Density Mg/m^3:	*2.36*		

Comments:

COLORADO REGISTERED ORVILLE R. WERNER II 14540 1/19/2009 PROFESSIONAL ENGINEER

CTL | Thompson Materials Engineers, Inc.

Orville R. Werner II, P.E.

22 Lipan Street | Denver, Colorado 80223 | Telephone: 303-825-0777 Fax: 303-893-1568

Orca SAND & GRAVEL LTD.

Revised: June 01, 2008

ORCA WASHED GRAVEL 1/2" x No.4 (12.5 x 4.75mm)

The Orca concrete aggregates are produced at the Orca Quarry, Port McNeill, B.C., in a modern and efficient washing and processing plant opened in March 2007 and distributed via ocean-going ships or barges. The California Department of Transportation has established that aggregates from this source are innocuous with respect to Alkali Silica Reactivity and has approved them for use in reduced mineral admixture (flyash) concrete. The CalTrans reference number to be quoted for this gravel is 07-CAN-OQ-2.

GRADATION – PERCENTAGE PASSING

SIEVE	ORCA GRAVEL (Typical Values)	SPECIFICATIONS	
		CALTRANS Per: 90-3.01 (2006)	ASTM C33-03 Type 7
19.0 mm (3/4")	100	100	100
12.5 mm (1/2")	98	82 - 100	90 - 100
9.5 mm (3/8")	65 X = 70	55 - 85 X ± 15	40 - 70
4.75 mm (#4)	2	0 - 15	0 - 15
2.36 mm (#8)	<1	0 - 6	0 - 5

PROPERTIES

	TEST	ORCA	SPECIFICATIONS	
			CALTRANS	ASTM
Specific Gravity, bulk SSD	CT 206	2.88		
Absorption	CT 206	0.5		
Dry Rodded Unit Weight, pcf	CT 212	115		
Cleanness Value	CT 227	>80	75 Min.	
Durability	CT 229	90		
Sodium Sulfate Soundness	C-214	<1%	10% Max.	12% Max.
Magnesium Sulfate Soundness	C-88	<1%		18% Max.
Los Angeles Abrasion (500 Revs)	C-535	5%	45% Max.	50% Max.
Materials Finer Than No. 200	C-117	<0.5%		1.0% Max.
Alkali Silica Reactivity	C-1260	0.01% Innocuous		0.10%

Herb G. A. Wilson, Chief Operating Officer.

Orca Sand & Gravel Ltd. • 6505 Island Highway • Port McNeill • BC • V0N 2R0
Telephone: (604) 628-3353 Facsimile: (604) 628-3354

Orca SAND & GRAVEL LTD.

Revised: June 01, 2008.

ORCA WASHED CONCRETE SAND

The Orca concrete aggregates are produced at the Orca Quarry, Port McNeill, B.C., in a modern and efficient washing and processing plant opened in March 2007 and distributed via ocean-going ships or barges. The California Department of Transportation has established that aggregates from this source are innocuous with respect to Alkali Silica Reactivity and has approved them for use in reduced mineral admixture (flyash) concrete. The CalTrans reference number to be quoted for this sand is 07-CAN-OQ-1.
Independent laboratory concrete trial mixes using Orca 1" x #4 gravel and Orca washed concrete sand produced results designated "Low Shrinkage" in accordance with test method ASTM C157 (Modified).

GRADATION – PERCENTAGE PASSING

SIEVE SIZE		ORCA SAND (Typical Values)		SPECIFICATIONS		
				CALTRANS Per: 90-3.01 (2006)		ASTM C 33-03
9.50 mm (3/8")		100.0		100		100
4.75 mm (#4)		99		95 – 100		95 – 100
2.36 mm (#8)		81		65 – 95		80 – 100
1.18 mm (#16)	"A"	68	X = 68	58 – 78	X ± 10	50 – 85
600 µm (#30)	"B"	49	X = 46	37 – 55	X ± 9	25 – 60
300 µm (#50)	"C"	25	X = 26	20 – 32	X ± 6	5 – 30
150 µm (#100)		6		2 – 12		0 – 10
75 µm (#200)		<2		0 – 8		0 – 3
	A – B	19		10 – 40		
	B – C	24		10 – 40		
Fineness Modulus		2.65 – 2.85				2.3 – 3.1

PROPERTIES

	TEST	ORCA	SPECIFICATIONS	
			CALTRANS	ASTM
Specific Gravity, bulk SSD	CT 206	2.78		
Absorption	CT 206	0.5		
Dry Rodded Unit Weight, pcf	CT 212	115		
Sand Equivalent	CT 217	85	75 Min.	
Durability	CT 229	80		
Sodium Sulfate Soundness	C-214	<2%	10% Max.	10% Max.
Magnesium Sulfate Soundness	C-88	<1%		15% Max.
Relative Mortar Strength	C-87	110%	95% Min.	
Materials Finer Than No. 200	C-117	<2%	8% Max.	3% Max.
Alkali Silica Reactivity	C-1260	0.01% Innocuous		0.10%

Herb G. A. Wilson, Chief Operating Officer.

Orca Sand & Gravel Ltd. • 6505 Island Highway • Port McNeill • BC • V6N 2E0
Telephone: (604) 628-3353 Facsimile: (604) 628 3354

Grace Construction Products

W.R. Grace & Co. – Conn.
293 Wright Brothers Avenue
Livermore, CA 94550

T 925-443-9700
www.graceconstruction.com

8/28/2008

Erick Francisco
Cemex
4750-A Norris Canyon Rd.
San Ramon, California 94583

Project Name: Product Information
Product Selected: WRDA® 64

This is to certify that the WRDA 64, a Water Reducer, as manufactured and supplied by Grace Construction Products, W.R. Grace & Co. – Conn., is formulated to comply with the Specifications for Chemical Admixtures for Concrete, ASTM: C494, Type A, D, AASHTO: M194, Type A, D.

WRDA 64 does not contain calcium chloride or chloride containing compounds as a functional ingredient. Chloride ions may be present in trace amounts contributed from the process water used in manufacturing.

The foregoing is in addition to and not in substitution for our standard Conditions of Sale attached.

Mike Gardner
Western Region Technical Services Manager

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval				McCarthy Approval
Spec Section	**Sub Section**	**Item No**	**Revision**	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements.
13 1104	2.1	781	0	By: Tom Dixon Date: 05/21/2009
Pool Ceramic Tile				Submittal Package No: 13 0000-0001-0
Approved for Submission				Swimming Pool Submittal, Western Water Features
By: Michael Leja				
Western Water Features, Inc.				

LPA, Inc Approval	Engineer Approval
1548 Eureka Road Suite 101 Roseville, CA 95661	

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval				McCarthy Approval
Spec Section	**Sub Section**	**Item No**	**Revision**	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements.
13 1104	2.2, 2.3, 2.4	783	0	By: Tom Dixon Date: 05/21/2009
Ceramic Tile Mortar and Grout				Submittal Package No: 13 0000-0001-0
Approved for Submission				Swimming Pool Submittal, Western Water Features
By: Michael Leja				
Western Water Features, Inc.				

LPA, Inc Approval	Engineer Approval
1548 Eureka Road Suite 101 Roseville, CA 95661	

711 MATERIALS, INC

SIEVE ANALYSIS OF MASONRY SAND

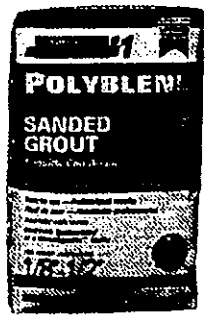
January 27, 2006

Contractor: *Silverado Building Materials*
Project: *Masonry Sand*

(1 X 4)	*25-mm x 4.75-mm*		
US	*METRIC*	*% Pass.*	*% Ret.*
NO. 4	*4.75-mm*	100	0
NO. 8	*2.36-mm*	100	0
NO. 16	*1.18-mm*	98	2
NO. 30	*600-um*	73	27
NO. 50	*300-um*	28	72
NO. 100	*150-um*	7	93
NO. 200	*75-um*	2	98

POLYBLEND® SANDED GROUT

- **Polymer-modified – mix with water for any tile or stone installation**
- **Consistent color**
- **Smooth, dense grout joints**
- **Resistant to shrinking, cracking, powdering and wear**
- **Meets ANSI A118.6 specifications**



PRODUCT DESCRIPTION

Polyblend's unique formula offers color consistency, fast setting time and a smooth texture for easy spreading and cleanup contractors prefer. Unmatched for its rock-hard curing properties, it produces dense joints that are highly resistant to shrinking, cracking, powdering and wear. Polymer-modified – mix with water for any tile or stone installation. Meets ANSI A118.6 specifications. Protected with MoldGard® Technology to resist mold and mildew growth.

USES

- For grouting vitreous, semi-vitreous or absorptive tile including ceramic, mosaic, quarry, pavers, cement, porcelain, brick, mini-brick, precast terrazzo and natural stone.
- For grout joints from 1/8" to 1/2" wide (3 - 13 mm).
- Use on floors, countertops, walls, ceilings, showers, fountains and pools.
- For interior or exterior installations.
- Rated (ASTM C627) for residential to extra-heavy commercial use.

LIMITATIONS

- Portland cement grout should not be installed when ambient temperature is below 50° F (10° C) or for exterior applications if rain is expected within 24 hours.
- For industrial and commercial installations where chemical resistance is required, use 100% Solids Epoxy Grout in accordance with ANSI A118.3.
- Some types of glazed ceramic tile, marble and stone can be scratched, stained or damaged when grouted with pigmented or sanded grouts. Generally white grout is best suited for grouting white or light colored marble or granite. Follow tile manufacturer's recommendations. Test a small area prior to use. Polyblend Non-Sanded Grout may be appropriate for tile not suitable for use with sanded grout.

  Certain tile with high absorption, surface porosity or rough, textured surfaces and certain types of porcelain may require sealing prior to grouting to prevent staining. Use TileLab® SurfaceGard® Penetrating Sealer as a grout release to prevent grout staining when required.
- Efflorescence, a crystalline deposit that sometimes appears on cement grout as a whitish powder or crust, can occur with any Portland cement-based product. If it occurs, remove with TileLab Sulfamic Acid Cleaner or Grout Haze Remover according to directions. Some natural stones are sensitive to acids. Test cleaners in an inconspicuous area before use. If the stone is sensitive, use TileLab Heavy-Duty Cleaner & Stripper.
- Color variations can occur in any Portland cement product including grout due to differing tile types, tile porosity, jobsite conditions, application/cleaning techniques. Color variations can be minimized by following directions and using as little water as possible for cleanup.
- Caution: Chemicals in salt-based pool filtration systems may cause a reaction with blue, green and red grouts. Contact Technical Services for recommendations.

SURFACE PREPARATION

Tile must be firmly attached to a sound substrate and setting material must be cured a minimum of 24 - 48 hours before grouting. Remove all spacers. Grout joints should be uniform in depth and width and free of all loose debris, contaminants and excess mortar. Pre-seal tile or stone that can be subject to staining with TileLab SurfaceGard Penetrating Sealer.

CUSTOM® BUILDING PRODUCTS

MIXING

To minimize color variation when using containers of the same color grout with different batch numbers, dry-blend the powder prior to mixing with water. Start with 2 quarts (1.89 L) of cool clean water. Mix in 25 lbs. (11.34 kg) of grout with margin trowel or low speed mixer (less than 300 rpm) to achieve a lump free, paste-like, non-pourable consistency. Do not use additives. If needed, up to one pint (473 ml) of additional water may be added to adjust consistency. Let stand 10 minutes, re-mix before use. Periodic mixing during application keeps the grout workable but do not add additional water once mixed as this weakens the material. Consistency of mixing ratio between batches helps to maintain color shade uniformity. Discard grout when too stiff to work, about 2 hours.

APPLICATION

Installation to conform to ANSI A108.10. Lightly dampen absorptive, highly porous tile with clean, cool water but leave no standing water in the joints. Holding a rubber grout float at a 45° angle, force grout diagonally into joints ensuring joints are completely filled. Remove excess grout using edge of float held at a 90° angle. Cleanup can begin when grout can be only slightly indented when pushed hard with your fingernail or about 10 – 20 minutes depending on the type of tile and ambient temperature. Use as little water as possible for grout cleanup. Excess water will weaken the joint, cause variation in color, and may cause shrinkage, cracks or pinholes. Smooth and level joints and remove excess grout from tile with a damp (not wet) small pore grout sponge using a circular motion. Change water and rinse sponge frequently. Using clean water and sponge will enhance color uniformity. Wait 2 hours before removing haze from tile surface with a soft, dry cloth.

CURING

Periodically mist the installation with clean, cool water for 3 days.

CLEANUP

Clean tools and hands with water before material dries.

COVERAGE

Coverage will vary depending on tile size and joint width.

CARE AND MAINTENANCE

MoldGard® Technology provides high resistance to mold and mildew growth. However, mold grows in the presence of moisture and a food source like dirt, food and soap scum that can accumulate on grout. Keep the grout clean with TileLab OneStep™ Cleaner & Resealer.

Seal grout joints with TileLab SurfaceGard Penetrating Sealer after grout has cured for 48 - 72 hours. For routine cleaning use TileLab OneStep Cleaner & Resealer.

SAFETY

Contains Portland cement. Avoid eye contact or prolonged contact with skin. Wash thoroughly after handling. If eye contact occurs, flush with water for 15 minutes and consult a physician. This product contains free silica. Do not breathe dust; wear NIOSH approved respirator.

TECHNICAL DATA

Meets or exceeds ANSI A118.6 specifications

Applicable Standards	A118.6
Linear Shrinkage: 7 day cure	<0.08%
Water Absorption: After immersion After drying	8% 10%
Compressive Strength	4,650 psi
Tensile Strength: 7 day cure 28 day cure	345 psi 423 psi
Flexural Strength (7 days)	>990 psi
Pot Life	1 - 2 hours
Initial Set	4 hours
Final Set	5 hours

WARRANTY

Eligible for Custom's Lifetime Installations Systems Warranty. For complete information call 800-272-8786 or visit www.custombuildingproducts.com.

1" x 1" x 1/4"	(25 x 25 x 6 mm)	63	(5.9)	40	(3.7)	25	(2.3)	23	(2.1)	20	(1.9)
2" x 2" x 1/4"	(50 x 50 x 6 mm)	88	(8.2)	73	(6.8)	50	(4.6)	40	(3.7)	33	(3.1)
3" x 3" x 1/4"	(75 x 75 x 6 mm)	150	(13.9)	103	(9.6)	80	(7.4)	55	(5.1)	45	(4.2)
4 1/4" x 4 1/4" x 1/4"	(108 x 108 x 6 mm)	210	(19.5)	143	(13.3)	110	(10.2)	75	(7.0)	60	(5.6)
6" x 6" x 1/4"	(150 x 150 x 6 mm)	263	(24.4)	178	(16.5)	136	(12.6)	93	(8.6)	70	(6.5)
8" x 8" x 3/8"	(200 x 200 x 9.5 mm)	230	(21.4)	155	(14.4)	113	(10.5)	75	(7.0)	50	(4.6)
12" x 12" x 3/8"	(300 x 300 x 9.5 mm)	345	(32.1)	230	(21.4)	175	(16.3)	118	(11.0)	90	(8.4)
16" x 16" x 3/8"	(400 x 400 x 9.5 mm)	458	(42.5)	305	(28.3)	225	(20.9)	144	(13.4)	94	(8.7)
18" x 18" x 3/8"	(450 x 450 x 9.5 mm)	512	(47.5)	343	(31.9)	253	(23.5)	167	(15.5)	118	(11)
20" x 20" x 3/8"	(500 x 500 x 9.5 mm)	567	(52.7)	381	(35.4)	280	(26.0)	189	(17.6)	142	(13.2)
24" x 24" x 3/8"	(600 x 600 x 9.5 mm)	685	(63.6)	458	(42.6)	325	(30.2)	225	(20.9)	150	(13.9)

ORDERING INFORMATION

We will match any color as a special order.

USA Stock Colors						
#9 Natural Gray	PBG097-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#10 Antique White	PBG107-4	7 lb. (3.17 kg)	Box	PBG1025	25 lb. (11.34 kg)	Bag
#11 Snow White	PBG117-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#17 Butter Cream	PBG177-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#19 Pewter	PBG197-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#22 Sahara Tan	PBG227-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#35 Chaparral	PBG357-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#45 Summer Wheat	PBG457-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#50 Nutmeg	PBG507-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#52 Tobacco Brown	PBG527-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#60 Charcoal	PBG607-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#90 Ocean Blue	PBG907-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#95 Sable Brown	PBG957-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#96 Quarry Red Clay	PBG967-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#101 Quartz	PBG1017-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#105 Earth	PBG1057-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#115 Platinum	PBG1157-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#122 Linen	PBG1227-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#135 Mushroom	PBG1357-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#145 Light Smoke	PBG1457-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#156 Fawn	PBG1567-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#165 Delorean Gray	PBG1657-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#180 Sandstone	PBG1807-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#185 New Taupe	PBG1857-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#190 Bay Leaf	PBG1907-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#195 Pale Mauve	PBG1957-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#301 Arctic Ice	PBG3017-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#305 Onyx Green	PBG3057-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#311 Moss	PBG3117-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#333 Alabaster	PBG3337-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#336 Winter Gray	PBG3357-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#365 Canvas	PBG3657-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#370 Dove Gray	PBG3707-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#380 Haystack	PBG3807-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#381 Bright White	PBG3817-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#382 Bone	PBG3827-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#383 Italian Straw	PBG3837-4	7 lb. (3.17 kg)	Box	PBG0925	25 lb. (11.34 kg)	Bag
#384 Camel	PBG3847-4	7 lb. (3.17 kg)	Box	PBG38425	25 lb. (11.34 kg)	Bag
#385 Driftwood	PBG3857-4	7 lb. (3.17 kg)	Box	PBG38525	25 lb. (11.34 kg)	Bag
#386 Oyster Gray	PBG3867-4	7 lb. (3.17 kg)	Box	PBG38625	25 lb. (11.34 kg)	Bag
#387 Captain's Blue	PBG3877-4	7 lb. (3.17 kg)	Box	PBG38725	25 lb. (11.34 kg)	Bag
#388 Mallard Green	PBG3887-4	7 lb. (3.17 kg)	Box	PBG38825	25 lb. (11.34 kg)	Bag
#389 North Sea Green	PBG3897-4	7 lb. (3.17 kg)	Box	PBG38925	25 lb. (11.34 kg)	Bag
#390 Rose Beige	PBG3907-4	7 lb. (3.17 kg)	Box	PBG39025	25 lb. (11.34 kg)	Bag
#405 Midnight Blue	PBG4057-4	7 lb. (3.17 kg)	Box	PBG40525	25 lb. (11.34 kg)	Bag
#410 Black Cherry	PBG4107-4	7 lb. (3.17 kg)	Box	PBG41025	25 lb. (11.34 kg)	Bag
#415 Concord Grape	PBG4167-4	7 lb. (3.17 kg)	Box	PBG41525	25 lb. (11.34 kg)	Bag
#420 Lipstick	PBG4207-4	7 lb. (3.17 kg)	Box	PBG42025	25 lb. (11.34 kg)	Bag
Special Order Colors						
All 48 colors available.	PBGXXX50	50 lb. (22.68 kg)	Bag			

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ORDERING INFORMATION

We will match any color as a special order.

Canada Stock Colors						
#9 Natural Gray	CPBG097-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#10 Antique White	CPBG107-4	7 lb. (3.17 kg)	Box	CPBG1025	25 lb. (11.34 kg)	Bag
#11 Snow White	CPBG117-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#17 Sutter Cream	CPBG177-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#19 Pewter	CPBG197-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#22 Sahara Tan	CPBG227-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#35 Chaparral	CPBG357-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#45 Summer Wheat	CPBG457-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#50 Nutmeg	CPBG507-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#52 Tobacco Brown	CPBG527-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#60 Charcoal	CPBG607-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#90 Ocean Blue	CPBG907-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#95 Sable Brown	CPBG957-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#96 Quarry Red Clay	CPBG967-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#101 Quartz	CPBG1017-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#105 Earth	CPBG1057-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#115 Platinum	CPBG1157-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#122 Linen	CPBG1227-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
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#195 Pale Mauve	CPBG1957-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
#301 Arctic Ice	CPBG3017-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
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#311 Moss	CPBG3117-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
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#335 Winter Gray	CPBG3357-4	7 lb. (3.17 kg)	Box	CPBG0925	25 lb. (11.34 kg)	Bag
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#410 Black Cherry	CPBG4107-4	7 lb. (3.17 kg)	Box	CPBG41025	25 lb. (11.34 kg)	Bag
#415 Concord Grape	CPBG4157-4	7 lb. (3.17 kg)	Box	CPBG41525	25 lb. (11.34 kg)	Bag
#420 Lipstick	CPBG4207-4	7 lb. (3.17 kg)	Box	CPBG42025	25 lb. (11.34 kg)	Bag

CUSTOM BUILDING PRODUCTS

Seal Beach, CA (562) 598-8808 Customer Support (800) 272-8786 www.custombuildingproducts.com Manufacturing facilities nationwide.

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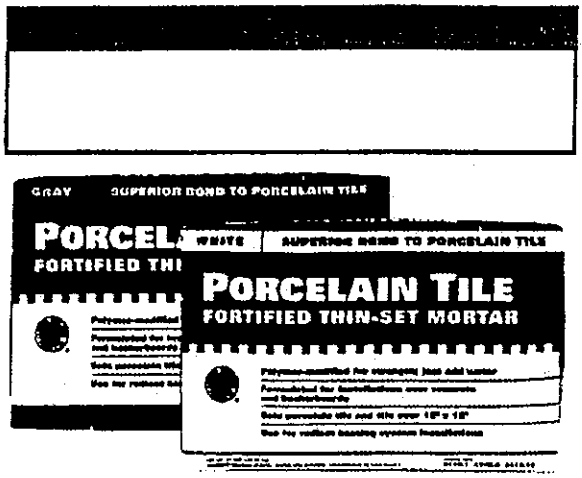
PORCELAIN TILE FORTIFIED THIN-SET MORTAR



- **Superior bond to porcelain tile**
- **Formulated for concrete and cement backerboard installations**
- **Excellent for setting glass tile and tile over 12" x 12" (30 x 30 cm)**
- **For radiant heating system installations**
- **Polymer-modified – Exceeds ANSI A118.4 and A118.11**

PRODUCT DESCRIPTION

Porcelain Tile Fortified Thin-Set Mortar has a proprietary combination of high-grade cements and polymers designed specifically for setting impervious porcelain, glass and tile 12" x 12" (30 x 30 cm) and larger to concrete surfaces, backerboards and self-leveling underlayments. Also great for radiant heating system installations. Exceeds ANSI A118.4 and A118.11 without the need for additives. Protected by MoldGard® Technology to resist mold and mildew growth.

USES — TILE TYPES

- Vitreous, semi-vitreous or absorptive tile: ceramic, mosaic, quarry, cement
- Impervious porcelain and glass tile
- Brick and mini-brick
- Precast terrazzo
- Natural stone tile

AREAS OF USE

- Interior or exterior floors, countertops, walls
- Concrete, mortar beds, masonry, Portland cement plaster
- WonderBoard®, cement backerboards
- Exterior grade plywood (interior residential and light commercial dry areas)
- Gypsum wall board (dry areas)
- Water-resistant wallboard
- Existing ceramic tile
- Sheet vinyl flooring, VCT
- Plastic laminates
- Cutback adhesive

LIMITATIONS

- Do not bond directly to hardwood, Luan plywood, particle board, parquet, cushion or sponge-back vinyl flooring, metal, fiberglass, plastic and OSB panels.
- When setting moisture sensitive natural stone, tile or agglomerates (check with manufacturer) use OptiCure™ Fortified Thin-Set Mortar or 100% Solids Epoxy Mortar.
- Do not use to install resin-backed stone.
- When setting glass tile larger than 6" x 6" (15 x 15 cm), contact Technical Services for recommendations.
- When setting dimensional stone larger than 12" x 12" (30 x 30 cm), contact Technical Services for recommendations regarding subfloor deflection requirements.

SURFACE PREPARATION

General Surface Preparation:
Surfaces must be structurally sound, clean, dry and free from grease, oil, dirt, curing compounds, sealers, adhesives or any other contaminant that would prevent a good bond. Glossy or painted surfaces must be sanded, stripped and cleaned of waxes, dirt or any contaminants. Ambient temperature, surfaces and materials should be maintained at a temperature above 50° F (10° C) or below 100° F (38° C) for 72 hours.

Cementitious Surfaces:
Concrete or plaster must be fully cured and accept water penetration. Test by sprinkling water on various areas of the substrate. If water penetrates, then a good bond can be achieved. If water beads, surface contaminants are present and loss of adhesion may occur. The contaminants should be removed before installation. Concrete must be free of efflorescence and not subject to hydrostatic pressure. Concrete slabs should have a broomed or brushed finish to enhance the bond. Smooth concrete slabs must be roughened to ensure a good bond.

CUSTOM® BUILDING PRODUCTS

DSC054 5/07R

Plywood Substrates:
Plywood floors including those under resilient flooring must be structurally sound and meet all ANSI and deflection requirements. For questions about proper subfloor installation, call Technical Service.

WonderBoard® Backerboard:
As a superior alternative to an additional layer of plywood, WonderBoard backerboard may be installed over plywood subfloors. Refer to the respective data sheet for installation information.

Existing Ceramic Tile, Resilient Flooring or Plastic Laminates:
Plywood flooring must be structurally sound and meet all ANSI and deflection requirements. Resilient flooring or plastic laminates must be well bonded, clean and free of all contaminates. Roughen the surface by sanding or scarifying, rinse and allow to dry. Do not sand flooring containing asbestos. For existing well-bonded ceramic tile, mechanically abrade with carborundum stone. Rinse and allow to dry. When sanding we recommend the use of an approved respirator.

Expansion Joints:
Expansion joints, control joints and cold joints should never be bridged with setting material. They must be brought through the tile work and filled with an appropriate elastomeric sealant.

Cutback Adhesive over Concrete:
Adhesive layers must be removed as they reduce mortar bond strength to cement surfaces. Use extreme caution as adhesives may contain asbestos fibers. Do not sand or grind adhesive residue, as harmful dust may result. Never use adhesive removers or solvents, as they soften the adhesive and may cause it to penetrate into the concrete. Adhesive residue must be wet-scraped to the finished surface of the concrete, leaving only the transparent staining from the glue. Do a test bond area first, to determine desirable results. Refer to the RFCI Pamphlet, "Recommended Work Practices for Removal of Resilient Floor Coverings" for further information.

MIXING
Thoroughly mix 6 quarts (5.68 L) clean, cool water and a 50 lb. (22.68 kg) bag of Porcelain Tile Fortified Thin-Set Mortar together to a smooth, paste-like consistency. Mix by hand or use a low speed (150 - 200 RPM) 1/2" (13 mm) drill. Let slake or stand 5 - 10 minutes, stir again and use. Stir occasionally to keep fluffy, but do not add more water. When properly mixed, troweled ridges will stand with no slump.

APPLICATION
INSTALLATION TO CONFORM TO ANSI A108.5. Use proper sized notch trowel to ensure 100% coverage under tiles. Use a 1/4" x 3/8" x 1/4" (6 x 9.5 x 6 mm) square-notch trowel when setting tile larger than 12" x 12" (30 x 30 cm). Using flat side of trowel, apply skim coat of mortar to the surface. Apply additional mortar with notched side of trowel held at a 45° angle to the surface, combing in one direction. Press tile firmly into place in a perpendicular motion across ridges, moving back and forth. Perpendicular pressing flattens ridges and closes valleys allowing maximum coverage. With some tile, back buttering is advisable. Adjust tile promptly and beat in with block and rubber mallet. Mortar can be applied up to 1/4" (6 mm) thick after beat in. For thicker applications, use a medium bed mortar. Periodically pull up a tile and check the back to ensure complete coverage with the adhesive. Do not spread more material than can be tiled in 15 minutes or while material has wet tack (sticky to the touch). If material has skinned over (not sticky), recomb with notched trowel. If too dry, remove and replace with fresh material. Material in bucket will remain workable in excess of 2 hours.

CURING
Allow to cure for a minimum of 24 hours before grouting or light traffic, depending upon temperature and humidity. Polyblend® Grout is recommended.

COVERAGE
90 - 100 sq. ft. per 50 lbs. (8.4 - 9.3 M²/22.68 kg) applied with 1/4" x 1/4" x 1/4" (6 x 6 x 6 mm) square-notch trowel.

60 - 70 q. ft. per 50 lbs. (5.6 - 6.5 M²/22.68 kg) applied with 1/4" x 3/8" x 1/4" (6 x 9.5 x 6 mm) square-notch trowel.

CLEAN-UP
Clean with water before material dries.

STORAGE
Store in a cool dry area.

SAFETY
Contains Portland cement. Wear rubber gloves and eye protection. Avoid eye contact or prolonged contact with skin. Wash thoroughly after handling. If eye contact occurs, flush with water for 15 minutes and consult a physician. This product contains free silica. Do not breathe dust; wear NIOSH approved respirator.

ORDERING INFORMATION

USA	PMG50	50 lb. (22.68 kg)	Gray	Bag
USA	PMW50	50 lb. (22.68 kg)	White	Bag
Canada	CPMG50	50 lb. (22.68 kg)	Gray	Bag

TECHNICAL DATA
Exceeds ANSI A118.4 and A118.11 specifications.

Pot Life	2 hours	
Open Time	50 minutes	
Adjustment Time		30 - 35 minutes
Shear Bond @ 28 Days:		
	Bisque Tile	550 psi (38.7 kg/cm²)
	Porcelain Tile	450 psi (31.6 kg/cm²)
	Quarry Tile to Plywood	190 psi (13.4 kg/cm²)

WARRANTY
Custom's Standard Warranty applies. For complete information call 800-272-8786 or visit www.customouildingproducts.com.

CUSTOM®
BUILDING PRODUCTS

Seal Beach, CA (562) 598-8808 Customer Support (800) 272-8786 www.custombuildingproducts.com Manufacturing facilities nationwide.

PORTLAND WHITE CEMENT TYPE I

Want To Buy.

CHARACTERISTICS

"Montania" White Cement is ideal for floor and wall decorations. It also su unlimited design of decorative items.

DESCRIPTION

The product conforms to ASTM C-150 Standard.

USAGE AND APPLICATIONS

Various applications can be applied as follows:

. Terrazzo Work

. Swimming Pool Plaster

. Sculpture

. Plastering

. Casting

. Floor and Roofing Tiles

. Cement Paint

. Pre-cast Systems

. Decorative Grouts and Mortars

. Stucco

PACKAGING

. 40 and 42.63 Kg Kraft Bag

PACKAGE CONDITION

Loose Bag or palletized in Container

SALE CONTACT

alisac@montaniacement.com Tel: +66-2586-4367
supoora@cementhai.co.th Tel:66-2586-4302
kochanop@cementhai.co.th Tel:66-2586-4328
pisarank@cementhai.co.th Tel:66-2586-4467

SPECIFICATION

CHEMICAL PROPERTIES		CONTROL LIMIT	ASTM Standar
Fe_2O_3	%	-	-
MgO	%	max1.50	max1.50
Total Alkali as Na_2O	%	max0.6	max0.6

Loss on ignition	%	max3.0		max3.0		
Insoluble residue	%	max0.50		max0.75		
PHYSICAL PROPERTIES						
Fineness specific surface						
Air permeability test	cm^2/g	min3200		min2800		
Soundness :						
Autoclave expansion	%	max0.40		max0.80		
Time of setting						
Vicat test :Initial set	minute	min140		min45		
Final set	minute	max375		max375		
Air content of Mortar	%	min12.0		max12.0		
False set	%	min50		min50		
Compressive strength (mortar cubes)		Mpa	psi	Kg/cm^2	Mpa	psi
3 days	Min	14.7	2130	122	11.0	1735
7 days	Min	22.5	3270	194	19.0	2760
28 days	Min	37.4	5400	285	28.0	4050
Whiteness (L)	%	Min 92.0				

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval				McCarthy Approval
Spec Section	**Sub Section**	**Item No**	**Revision**	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements.
13 1105	2.1-2.5	784	0	
Pool Plaster and Waterproofing				By: Tom Dixon Date: 05/21/2009
Approved for Submission By: Michael Leja Western Water Features, Inc.				Submittal Package No: 13 0000-0001-0 Swimming Pool Submittal, Western Water Features
LPA, Inc Approval				**Engineer Approval**
1548 Eureka Road Suite 101 Roseville, CA 95661				

Chemical Lime
A Lhoist Group Company

NATIVIDAD PLANT – PRODUCT DATA SHEET

HIGH PURITY DOLOMITIC PRODUCTS

Dolomite Pool Grade

SAP Article #: 1253 Pool Grade - Bagged
SAP Article #: 1262 Pool Grade - Bulk
CAS Registry # 16389-88-1

Property	Symbol	Method	Min. %	Typical %	Max. %
Moisture	H_2O	ASTM C25	0.0	0.1	0.3
Loss On Ignition, 1000 ^{0}C	LOI	ASTM C25	46.5	47.0	47.4
Acid Insoluble	Acid Insol.	ASTM C25	0.4	1.1	1.8
Silicon Dioxide	SiO_2	ASTM C25	0.2	1.0	1.4
Ferric Oxide	Fe_2O_3	ASTM C25	0.09	0.14	0.20
Aluminum Oxide	Al_2O_3	ASTM C25	0.03	0.05	0.10
Manganese Oxide	MnO	ASTM C25	0.03	0.04	0.05
Sulfur	S	ASTM C25	0.004	0.005	0.008
Phosphorous	P	ASTM C25	0.005	0.010	0.020
Potassium Oxide	K_2O	ASTM C25	0.004	0.005	0.006
Sodium Oxide	Na_2O	ASTM C25	0.002	0.003	0.005
Calcium Oxide	CaO	ASTM C25	30.8	31.2	31.9
Magnesium Oxide	MgO	ASTM C25	20.3	20.8	21.3
Calcium Carbonate	$CaCO_3$	ASTM C25	54.9	55.6	56.7
Magnesium Carbonate	$MgCO_3$	ASTM C25	42.4	43.5	44.6
Specific Gravity	g/cm^3	ASTM C135		2.85	
Bulk Density (Loose)	lbs/ft^3/g/cm^3	ASTM C110		103/1.65	
Hardness	Mho	ASTM C25		3.5-4	

FOR PLASTER

Chemical Lime
A Lhoist Group Company

NATIVIDAD PLANT – PRODUCT DATA SHEET

HIGH PURITY DOLOMITIC PRODUCTS

Dolomite Pool Grade

U.S. Sieve	Opening mm	% Retained - ASTM C110		
		Min.	Typical	Max.
+12	1.700	0.0	0.1	0.3
+16	1.180	9	14	17
+20	.850	13	17	22
+30	.600	13	16	19
+40	.425	12	14	16
+50	.300	10	13	15
+60	.250	3	6	9
+70	.212	3	4	7
+100	.150	5	7	9
+140	.106	2	4	7
+200	.075	1	3	5
- 200	.075	1	2	4

U.S. Sieve	Opening mm	% Passing - ASTM C110		
		Min.	Typical	Max.
12	1.700	99.5	99.9	100.0
16	1.180	77	86	96
20	.850	61	69	85
30	.600	41	53	63
40	.425	36	39	45
50	.300	23	26	35
60	.250	18	20	28
70	.212	6	16	25
100	.150	3	9	15
140	.106	0.1	5	12
200	.075	0.1	2	3

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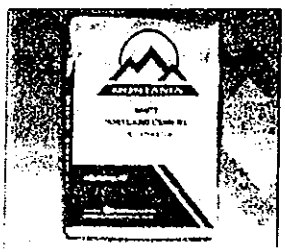
PORTLAND WHITE CEMENT TYPE I



Want To Buy.

CHARACTERISTICS

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DESCRIPTION

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USAGE AND APPLICATIONS

Various applications can be applied as follows:

- Terrazzo Work
- Swimming Pool Plaster
- Sculpture
- Plastering
- Casting
- Floor and Roofing Tiles
- Cement Paint
- Pre-cast Systems
- Decorative Grouts and Mortars
- Stucco

PACKAGING

- 40 and 42.63 Kg Kraft Bag

PACKAGE CONDITION

Loose Bag or palletized in Container

SALE CONTACT

alisac@montaniacement.com Tel:+66-2586-4367
supoora@cementhai.co.th Tel:66-2586-4302
kochanop@cementhai.co.th Tel:66-2586-4328
pisarank@cementhai.co.th Tel:66-2586-4467

SPECIFICATION

CHEMICAL PROPERTIES		CONTROL LIMIT	ASTM Standar
Fe_2O_3	%	-	-
MgO	%	max1.50	max1.50
Total Alkali as Na_2O	%	max0.6	max0.6

Loss on ignition	%	max3.0		max3.0		
Insoluble residue	%	max0.50		max0.75		
PHYSICAL PROPERTIES						
Fineness specific surface						
Air permeability test	cm^2/g	min3200		min2800		
Soundness :						
Autoclave expansion	%	max0.40		max0.80		
Time of setting						
Vicat test :Initial set	minute	min140		min45		
Final set	minute	max375		max375		
Air content of Mortar	%	min12.0		max12.0		
False set	%	min50		min50		
Compressive strength (mortar cubes)		Mpa	psi	Kg/cm^2	Mpa	psi
3 days	Min	14.7	2130	122	11.0	1735
7 days	Min	22.5	3270	194	19.0	2760
28 days	Min	37.4	5400	285	28.0	4050
Whiteness (L)	%	Min 92.0				

BASF

The Chemical Company

PRODUCT DATA

7 07 16 00 **Cementitious Waterproofing**

THOROSEAL®

Waterproof cement-based coating for concrete and masonry

Description

Thoroseal® is a Portland-cement-based coating for concrete and masonry that resists both positive and negative hydrostatic pressure. Polymer-modified with Acryl 60®, Thoroseal® creates a low-maintenance and highly durable waterproof barrier.

Yield

225 ft²/50 lb (20.9 m²/22.7 kg) bag as a base coat at 1/16" (1.6 mm) dry-film thickness.

450 ft²/50 lb (41.8 m²/22.7 kg) bag as a topcoat at 1/32" (0.8 mm) dry-film thickness.

Coverage will vary depending on surface texture and porosity.

Packaging

THOROSEAL®

10 lb (4.5 kg) cans for Thoroseal® white and standard gray only

30 lb (13.6 kg) polyethylene-lined bags for Thoroseal® white and standard gray only

50 lb (22.7 kg) polyethylene-lined bags for Thoroseal® white, standard gray, all landscape colors and custom colors

60 lb (27.2 kg) pails for Thoroseal® white, standard gray, landscape colors, and custom colors

ACRYL 60®

1 quart (0.9 L) bottles

1 gallon (3.8 L) bottles

5 gallon (18.9 L) pails

30 gallon (113 L) drums

55 gallon (208 L) drums

Features

- Waterproof
- Resistant to both positive and negative hydrostatic pressure
- Breathable
- Compatible with high-performance coatings
- Aesthetically beneficial
- Aesthetically superior

Benefits

Protects building interiors from dampness and moisture damage

Suitable for use below grade interior and exterior and in water-treatment construction

Allows interior moisture to escape without damaging coating

Accepts a wide range of architectural coatings and textured finishes

Hides minor surface defects and blemishes in architectural concrete

Available in 10 landscape colors and in custom colors (with minimum order quantities)

Color

White and standard gray (this color is not uniform)

Custom and landscape colors are available for 5,000 lbs (2,268 kg) minimum order.

Ten landscape colors : bone, dijon, French vanilla, good earth, light khaki, Thoro® gray, Navajo white, parchment, pearl gray, and putty tan

Shelf Life

1 year when properly stored

Storage

Transport and store in unopened containers and keep in a clean, dry condition protected from rain, dew and humidity. Do not stack bags more than 2 pallets high. If dry onsite storage of bags is unavailable or if project is located in a very wet, humid climate zone, then specify Thoroseal® packaged in 60 lb (27.2 kg) metal pails. Store Acryl 60® in similar conditions. Do not allow Acryl 60® to freeze.

Where to Use

APPLICATION

- Alternative to mechanical finishing or rubbing of concrete
- Waterproofing basement and retaining walls
- Foundations
- Bridges and tunnels
- Water cisterns

LOCATION

- Vertical and light-pedestrian horizontal surfaces
- Interior and exterior
- Above and below grade

SUBSTRATE

- Cast-in-place and precast concrete
- Block, brick and porous stone

Thoro

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Technical Data

Composition

Thoroseal® contains cement, graded sand, and proprietary additives.

Test Data

PROPERTY	RESULTS	TEST METHODS
Initial Set, min, at 70° F (21° C), 50% rh	10	Lab Method
Final Set, at 70° F (21° C), 50% rh	90	Lab Method
Density, (cured), lbs/ft³ (kg/m³)	129 (2,080)	Lab Method
Positive resistance to hydrostatic pressure, hrs, at 200 psi (1.4 MPa), 461 head ft, air cured at 70° F (21° C), 50% rh	752 No leakage, no softening	CRD C 48, modified
Negative resistance to hydrostatic pressure, hrs, at 200 psi (1.4 MPa), 461 head ft, air cured at 70° F (21° C), 50% rh	664 Limited dampness	CRD C 48, modified
Water absorption, %, boiling water submersion at 24 hours	3.6	ASTM C 67 (Section 7.3)
Compressive strength, psi (MPa)		ASTM C 109
7 days	4,200 (29)	
28 days	6,030 (42)	
Flexural strength, psi (MPa)		ASTM C 348
7 days	360 (2.5)	
28 days	1,027 (7)	
Tensile strength, psi (MPa)		ASTM C 190
7 days	250 (2)	
28 days	440 (3)	
Modulus of elasticity, psi (MPa)		ASTM C 469
28 days	2.72×10^6 (1.87×10^4)	
Artificial weathering, hrs		
Xenon Arc	5,000 = No failure	ASTM G 26
Carbon Arc	500 = No failure	ASTM G 23
Adhesion strength, psi (MPa)	418 (2.9)	Test by tensile bond
Artificial weathering,	No cracking, loss of adhesion, checking, or other defect	Atlas Type DMC weatherometer
Freeze/thaw resistance, 200 cycles	No change	ASTM C 666 (Procedure B)
Salt spray resistance, 300 hours	No defect	ASTM B 117
Carbon Dioxide (CO_2), in (mm)	1/16 (1.6) Equivalent to 3/4" (19 mm) new concrete	Lab Method Diffusion
Permeance, perms (metric permeability)	12 (0.10698) 18×10^3 resistance	ASTM E 96 (water-vapor transmission) Swedish standard SS-02-15-82

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Test Data, continued

PROPERTY	RESULTS	TEST METHODS
Wind-driven rain, hrs	8 = excellent	Fed. Spec. TT-P-0035 (Para 4.4.7)
Coefficient of thermal expansion, in/in/° F (mm/mm/° C), at 28 days	6.99 x 10^{-6} (5 x 10^{-6})	ASTM C 531
Impact strength (Gardener impact tester)	No chipping	Fed. Spec. TT-P-0035 (Cement paints para. 3.4.8)
Hardness, (Barber Colemen Impressor) Requirement min = 30, max = 60		Fed. Spec. TT-P-0035 (para 4.4.9)
7 days	35	
14 days	47	
21 days	52	
Abrasion resistance, 3,000 L sand	Passed	Fed. Spec. TT-P-141B
Reflectance		ASTM D 2244 using Hunterlab D-25 meter
Gray Thoroseal®	64.2	
White Thoroseal®	88.1	
Fungus resistance, at 21 days	No growth; meets all requirements	Fed. Spec. TT-P-29B
Surface burning characteristics		ASTM E 84
Flame Spread	0	
Smoke developed	5	
Fire Propagation	Index = 1.5	BS476: Part 6:1981
Flame spread	Class 1	BS476: Part 7:1971

Test results are averages obtained under laboratory conditions. Reasonable variations can be expected.

How to Apply

Surface Preparation

1. Surface preparation is extremely important for proper adhesion. Substrates must be sound and free of dust, dirt, laitance, paints, oils, grease, curing compounds or any other contaminants. Verify substrate has properly cured. Concrete should obtain 80% of design strength, typically achieved within 3 – 14 days. If efflorescence is present, mechanically remove it before proceeding. For extreme cases where this is not adequate, contact Technical Service.

2. Patch all holes and cracks before installation.

3. Relieve hydrostatic pressure in concrete block with weep holes.

4. Roughen or brush blast extremely smooth surfaces such as precast and cast-in-place concrete to ensure good mechanical adhesion of Thoroseal®.

Mixing

1. Mix Thoroseal® with a mixing liquid consisting of a blend of Acryl 60® diluted with water. Maximum dilution ratio is 1 part Acryl 60® to 3 parts water. Approximately 6 quarts of mixing liquid is needed per 50 lbs of Thoroseal® powder. Up to 2 additional quarts of mixing liquid may be added when using as a rubbing compound.

2. For best results, mechanically mix Thoroseal® with a slow-speed drill and mixing paddle. Gradually add the powder to the mixing liquid while drill is running.

3. When properly blended, Thoroseal® will have the lump-free consistency of smooth, heavy batter.

4. Allow the Thoroseal® and Acryl 60® mixture to rest undisturbed for a minimum of 10 minutes to fully wet out all the powder. Then remix the wet mixture and apply. A small amount of mixing liquid can be added to this remixing.

5. Pot life is 60 – 90 minutes at 70° F (21° C). At high temperatures and low relative humidity, pot life can be significantly less.

Application

1. Apply Thoroseal® with a Thoro® brush or broom or equivalent stiff fiber brush or by textured spray equipment. Spray applications of the first coat require back brushing or brooming to properly fill voids and achieve uniformity.

2. Completely dampen the substrate with water before application starts. Do not saturate the substrate, but keep it cool and damp throughout the application.

3. It is essential to work first coat thoroughly into the substrate to completely fill and cover all voids, holes and nonmoving cracks. Finish with a horizontal stroke for an even coat.

4. Allow to cure 24 hours, then apply the second coat and finish with a vertical stroke. Above grade, the second coat can be replaced with a Thoro® high-build architectural coating to achieve better color uniformity.

5. On block or masonry walls, allow 5 – 7 days before applying second coat to eliminate joint read through.

Specific Applications

Above-grade interior or exterior applications in positive pressure situations (direct contact with rain or standing water with a low head of pressure)

1. A 50 lb (22.7 kg) bag of Thoroseal® will provide the following coverage at the designated material usage.

Recommended coverage:

- First Coat: 2 lbs/yd² (1.1 kg/m²) = 225 ft²/50 lb bag (20.9 m²/22.7 kg bag)
- Second Coat: 1 lb/yd² (0.54 kg/m²) = 450 ft²/50 lb bag (41.8 m²/22.7 kg bag)
- Total: 3 lbs/yd² (1.6 kg/m²), cured nominal thickness of 1/16" (1.6 mm).

Coverage will vary depending on surface texture and porosity.

2. A 3 lbs/yd² (1.6 kg/m²) application rate does not eliminate surface irregularities such as struck mortar joints. To hide surface irregularities, spray and back-brush a base coat of Thoroseal® at 2 lbs/yd² (1.1 kg/m2) and allow it to cure for 5 – 7 days. Then spray apply and back trowel a topcoat of Thoroseal® Plaster Mix (see Form No. 1019908) at an application rate of 9 lbs/yd² (4.9 kg/m²).

BELOW-GRADE INTERIOR APPLICATIONS

1. The standard application is 3 lbs/yd² (1.6 kg/m²).

2. For high hydrostatic pressure conditions (over 15 psi [0.10 MPa]), increase application rate to 4 lbs/yd² (2.2 kg/m²) and waterproof from the positive side wherever possible.

BELOW-GRADE EXTERIOR APPLICATIONS

1. Use Thoroseal® Foundation Coating (see Form No. 1019907) For high hydrostatic pressure conditions (over 15 psi [0.10 MPa]), apply a base coat of Thoroseal® Foundation Coating at 2 lbs/yd² (1.1 kg/m²) and allow to cure for 5 – 7 days.

2. Then apply a topcoat of Thoroseal® Plaster Mix at 12 lbs/yd² (6.5 kg/m²). A steel trowel finish is recommended.

3. For both below-grade interior and below-grade exterior applications where water might move between vertical walls and slab or footer, it is recommended to cut out and place a Waterplug® cove at the wall and floor junction prior to the application of the Thoroseal® base coat.

4. Thoroseal® can be covered with extruded polystyrene insulation board during the second coat application. The board must be fully coated with Thoroseal® and embedded into the still-wet coating already in place on the walls. Exercise care when placing the coated board because it should not be moved or slipped. Once placed, do not move the board. After curing, prepare the above-grade portions of the boards by roughening or removing the surface skin and then coating with Thoroseal® to protect them from UV light degradation.

WATERPROOFING POTABLE WATER TANKS OR RESERVOIRS

1. Install Thoroseal® as directed in the general Application instructions.

2. After Thoroseal® has fully cured, wash down the Thoroseal® surface with saline solution (salt brine, 1 lb salt per 1 gallon water).

3. Leave saline solution on the entire Thoroseal® surface for at least 24 hours.

4. Rinse off saline solution completely. If needed, reapply saline solution until final rinse water is completely clean and clear.

Color Uniformity

With any cementitious product, such as Thoroseal®, it may be difficult to achieve color uniformity due to weather and substrate variability. For this reason, it may be necessary to apply a topcoat of a Thoro® architectural coating.

Clean Up

Promptly clean hands and all tools with warm water while product is still wet. Cured material may only be removed mechanically.

For Best Performance

- Thoroseal® must be modified with Acryl 60® to achieve the properties listed in the technical data section.
- Do not apply to substrates with active water leaks or moving cracks; patch all leaking static cracks and holes with Waterplug®. Repair any other nonmoving cracks or voids with the appropriate Thoro® repair product and repair all moving cracks or voids with appropriate sealant.
- Maintain or place expansion and control joints as necessary.
- Do not apply in rain or when rain is expected within 24 hours. Do not apply above 90° F (32° C) or below 40° F (4° C) or when temperatures are expected to fall below 40° F (4° C) within 24 hours. For hot and cold temperature applications, store Thoroseal®, Acryl 60® and water at 50° F (10° C) to 70° F (21° C) before use.
- Hot substrates will effect working time and material strength.
- Variations between inside and outside temperatures may result in condensation on below-grade walls treated with Thoroseal®. This can be alleviated by assuring that adequate ventilation exists.
- Windy, dry or hot conditions may require rewetting of Thoroseal® during cure and the use of polyethylene barriers.
- Before specifying Thoroseal® for water-retaining structures, conduct tests to determine water quality. Thoroseal® is not intended for continuous contact with acid or sulfate-containing water. Very soft water will have an adverse effect on Thoroseal®.
- Service temperatures: immersion, up to 140° F (60° C); cleaning water, up to 200° F (93° C); dry air, up to 220° F (104° C).
- On all projects, it is recommended that a sample be prepared on site and approved prior to the commencement of the work. The site sample should confirm the color, texture and workmanship required until the job is finished and accepted. Retain the sample until final approval is secured.
- Allow Thoroseal® to cure 7 – 10 days before immersion in water.
- Make certain the most current versions of product data sheet and MSDS are being used; call Customer Service (1-800-433-9517) to verify the most current version.
- Proper application is the responsibility of the user. Field visits by BASF personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.

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Health and Safety

THOROSEAL®

Warning!

Thoroseal® contains Portland cement; silica, crystalline quartz; iron oxide; magnesium oxide; limestone; gypsum; calcium hydroxide; calcium oxide and anhydrite.

Risks

Product is alkaline on contact with water and may cause injury to skin or eyes. Ingestion or inhalation of dust may cause irritation. Contains small amount of free respirable quartz which has been listed as a suspected human carcinogen by NTP and IARC. Repeated or prolonged overexposure to free respirable quartz may cause silicosis or other serious and delayed lung injury.

Precautions

KEEP OUT OF THE REACH OF CHILDREN. Avoid contact with skin, eyes and clothing. Prevent inhalation of dust. Wash thoroughly after handling. Keep container closed when not in use. DO NOT take internally. Use only with adequate ventilation. Use impervious gloves, eye protection and if the TLV is exceeded or used in a poorly ventilated area, use NIOSH/ MSHA approved respiratory protection in accordance with applicable federal, state and local regulations.

First Aid

In case of eye contact, flush thoroughly with water for at least 15 minutes. In case of skin contact, wash affected areas with soap and water. If irritation persists, SEEK MEDICAL ATTENTION. Remove and wash contaminated clothing. If inhalation causes physical discomfort, remove to fresh air. If discomfort persists or any breathing difficulty occurs or if swallowed, SEEK IMMEDIATE MEDICAL ATTENTION.

Refer to Material Safety Data Sheet (MSDS) for further information.

Proposition 65

This product contains material listed by the state of California as known to cause cancer, birth defects, or other reproductive harm.

VOC Content

0 lbs/gal or 0 g/L, less water and exempt solvents.

For medical emergencies only, call ChemTrec (1-800-424-9300).

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BASF Building Systems
889 Valley Park Drive
Shakopee, MN, 55379
www.BASFBuildingSystems.com
Customer Service 800-433-9517
Technical Service 800-243-6739

For professional use only. Not for sale to or use by the general public.

Form No. 1019906 5/07
Printed on recycled paper including 10% post-consumer fiber.

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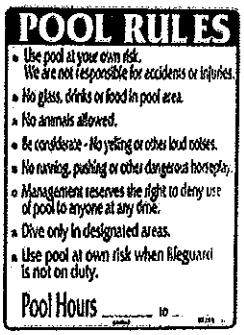
Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

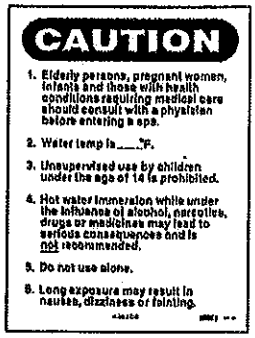
Preparer Approval	McCarthy Approval
Spec Section **Sub Section** **Item No** **Revision** 13 1106 2.1E, 2.3, 2.4, 2.5-2.13 785 0 Pool Equipment **Approved for Submission** By: Michael Leja Western Water Features, Inc.	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements. By: Tom Dixon Date: 05/21/2009 Submittal Package No: 13 0000-0001-0 Swimming Pool Submittal, Western Water Features
LPA, Inc Approval	**Engineer Approval**
1548 Eureka Road Suite 101 Roseville, CA 95661	



45-005

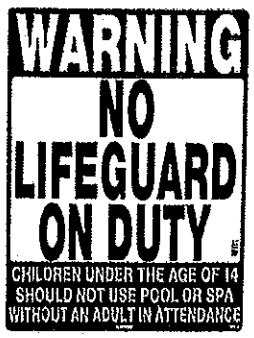
FACILITY SAFETY SIGNS
18" X 24" SIGNS

PUBLIC POOL RULES SIGN — List of 8 regulations for the use of public pools.
45-005



45-010

SPA RULES SIGN — List of 6 rules.
45-010



45-015

WARNING: NO LIFEGUARD ON DUTY SIGN
Children under 14 should not use pool without an adult in attendance.
45-015

45-020

NO USE OF POOL AFTER DARK SIGN
45-020

45-025

RESCUE BREATHING AND CHOKING SIGN
Step-by-step instructions for saving a life for artificial respiration and choking. Includes illustrations for proper rescue techniques.
45-025

45-030

ARTIFICIAL RESPIRATION SIGN — Step-by-step instructions for when breathing stops. Includes illustrations with steps for mouth-to-nose rescue.
45-030

45-040

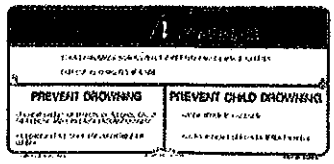
18" X 12" SIGN

NO RUNNING SIGN
45-040

45-042

40" X 48" SIGN

UNIVERSAL SAFETY SIGN — Pool/spa caution, no diving, pool/spa capacity, artificial respiration, 911, no lifeguard and pool/spa rules. Complies with California Codes.
45-042



45-045

11½" X 5½" SIGN

SPA SAFETY SIGN— Spa safety sign designed to meet UL requirements. Cautions spa users of risks for pregnant women and children.
45-045

45-046

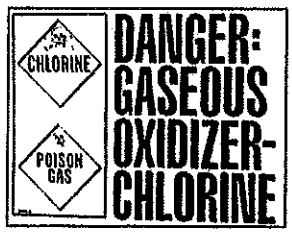
12" X 9" SIGN

EMERGENCY SHUT-OFF SWITCH SIGN
45-046

45-047

12" X 6" SIGN

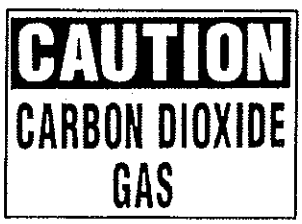
EMERGENCY 911 SIGN
45-047



45-050

CHEMICAL SAFETY SIGN
24" X 18" SIGN

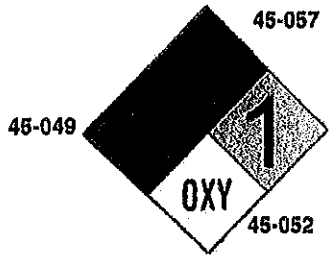
DANGER: GASEOUS OXIDIZER— Chlorine gas warning sign.
45-050



45-055

14" X 10" SIGN

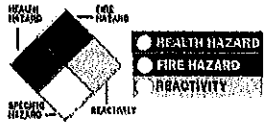
CAUTION: CARBON DIOXIDE GAS— Warning sign.
45-055



HAZARDOUS MATERIALS SIGN

NFPA SIGN — Based on the National Fire Protection Association's code, provides identification of hazardous chemical storage areas. Panels are supplied blank, 4" vinyl letters/numbers complete your sign for your specific requirements.

45-049 NFPA sign, fiberglass, 11"
45-051 NFPA label, 10"



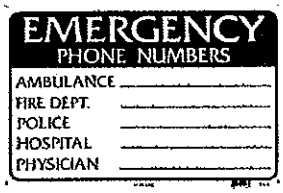
NFPA VINYL LETTERS/NUMBERS

45-052 OXY
45-053 ACID
45-054 COR
45-056 ALK
45-057 (Numbers 0-9)

45-080

OSHA SIGNS

45-060 Danger Acid
45-065 Danger Caustic
45-070 Danger Chlorine
45-075 Danger Chlorine Gas
45-080 Danger Chemical Storage



45-090

12" X 18" SIGNS

EMERGENCY PHONE NUMBER SIGN — Lists phone numbers for police, physician, ambulance, and fire department.

45-090

45-095

POOL CAPACITY SIGN — Listing for maximum number of swimmers allowed.

45-095

45-100

SPA CAPACITY SIGN — Listing for maximum number of persons allowed.

45-100

45-105

SWIMMING POOL CLOSED SIGN

45-105

45-110

PLEASE SHOWER BEFORE ENTERING POOL SIGN

45-110

45-115

NO DIVING ALLOWED SIGN

45-115

45-120

DIVING CAUTION SIGN — Cautions patrons of the potential hazards of diving.

45-120

SWIM & SAFETY MARKERS

SWIM & SAFETY MARKERS — Highly visible yellow plastic free-standing signs to mark the designated speed of your lap swimming lane. Safety identification markers also available. They're lightweight, portable and fold-up for convenient storage.

LAP SWIM MARKERS

56-070 Slow
56-075 Medium
56-080 Fast
56-085 Lane Closed
56-090 Adult Swim Only
56-091 Lap Swim Only
56-092 Circle Swim Only
56-093 Warm-Up Lane Only

SAFETY MARKERS

56-086 Board Closed
56-087 Slide Closed
56-069 Pool Closed
56-067 Spa Closed
56-094 No Diving
56-088 No Running
56-101 Aquatic Fitness Class
56-102 Swim Lessons Only
56-089 Caution Wet Floor
56-068 No Shoes on Deck
56-071 Blank sign only

45-125

45-130

45-135

8" X 18" SIGNS

EMERGENCY EYEWASH SIGN

45-125 Emergency eyewash sign
45-130 Emergency drench hose sign

10" X 7" SIGN

EMERGENCY SPILL RESPONSE SIGN

45-135

45-140

45-145

45-150

EQUIPMENT INSPECTION TAGS

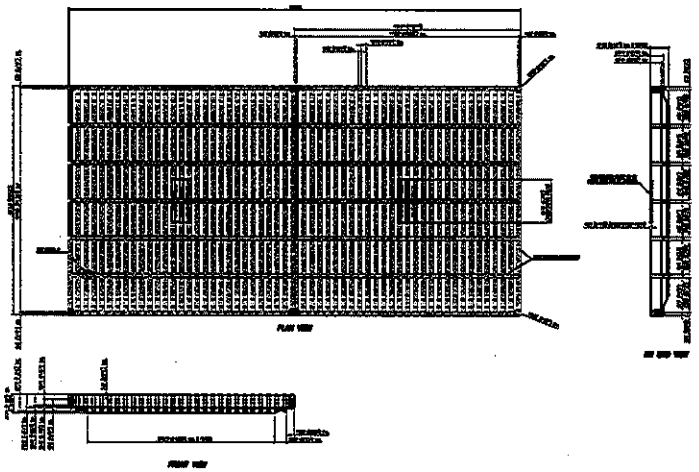
EQUIPMENT INSPECTION TAGS — Ideal for periodic inspection record keeping. Heavy duty cardstock construction with 12" cotton string. Size: 5" x 3". Package of 25.

45-140 Calibration record
45-145 Filter replacement record
45-150 Preventive maintenance record

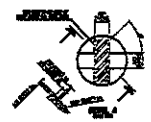
18" X 36" MAIN DRAIN SYSTEM

CERTIFIED AS "UNBLOCKABLE" UNDER ASME A112.19.8-2007 VGB2008

MEETS OR EXCEEDS:
ASTM E-661-92--DEFLECTION/LOAD TO FAILURE
18" X 36" GRATE RATED @1600 GPM
@1.5 FPS WITH 54% OPEN AREA



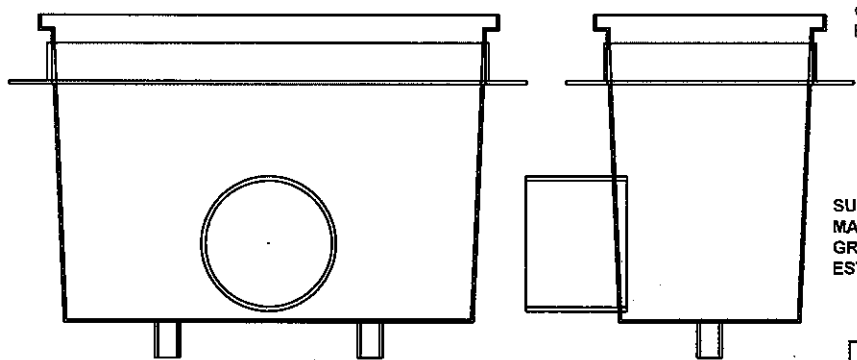
The fiberglass sump is fabricated using 8oz. of fiberglass mat, marine quality resin and colored gel coat. The gel coat is only applied to the inside of the sump. The wall thickness is approximately .19" +/- .01". 2" FRP Waterstop glassed onto sump.



Grate shall be U.V. stabilized, high grade outdoor formula injection molded PVC, compliant and certified to ASME112.19.8.2007 VGB2008

Maximum bar spacing shall be $\frac{3}{8}$". All grates shall have a load to failure in excess of 1,000lbs as per ASTM E661-092.

Minimum open area of 54% must be documented on submittal information. Flow of 1600GPM @1.5 foot per second.



SUMP AND GRATES SHALL BE MANUFACTURED AND SUPPLIED BY GRATE TECHNOLOGIES--800-897-6160 OR ESTIMATING@GRATETECH.COM

***REMAINING OPEN AREA OUTSIDE OF BLOCKING ELEMENT WILL SUPPLY 100% OF MAXIMUM RATED FLOW AS DEFINED BY ASME A112.19.8-2007Rev CALCULATIONS FOR ALLOWABLE FLOW VELOCITY.

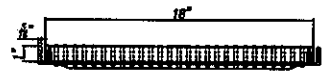
LAWSON AQUATICS

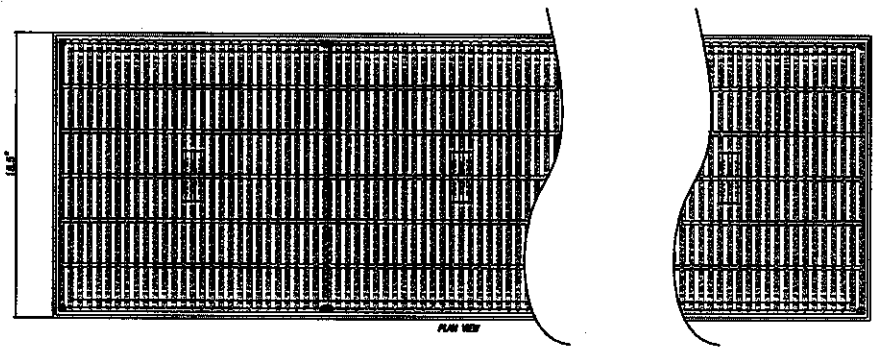
36"L X 18"W X 24"H SUMP/GRATE

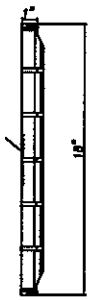
18" X 36 /54 /72 /90..." FRAME AND GRATE

CERTIFIED AS **"UNBLOCKABLE"** UNDER ASME A112.19.8-2007 VGB2008

***REMAINING OPEN AREA OUTSIDE OF BLOCKING ELEMENT WILL SUPPLY 100% OF MAXIMUM RATED FLOW AS DEFINED BY ASME A112.19.8-2007 VGB2008 CALCULATIONS FOR ALLOWABLE FLOW VELOCITY.







MEETS OR EXCEEDS:

ASTM G-154– U.V. STABILIZATION
ASTM C-1028– COEFFICIENT OF FRICTION
ASTM E-661-92–DEFLECTION/LOAD TO FAILURE
EACH 18" GRATE INCREMENT RATED @ 800 GPM @1.5 FPS WITH 54% OPEN AREA

GRATE SIZE	GPM FLOW RATE
18 X 36	1600 GPM
18 X 54	2400 GPM
18 X 72	3200 GPM
18 X 90	4000 GPM
18 X 108	4800 GPM

GRATE SIZE	GPM FLOW RATE
18 X 126	5600 GPM
18 X 144	6400 GPM
18 X 162	7200 GPM
18 X 180	8000 GPM
18 X 198	8800 GPM

EACH ADDITIONAL 18 INCH GRATE WILL ADD AN ADDITIONAL 800 GPM @1.5 FT/SEC

LAWSON AQUATICS

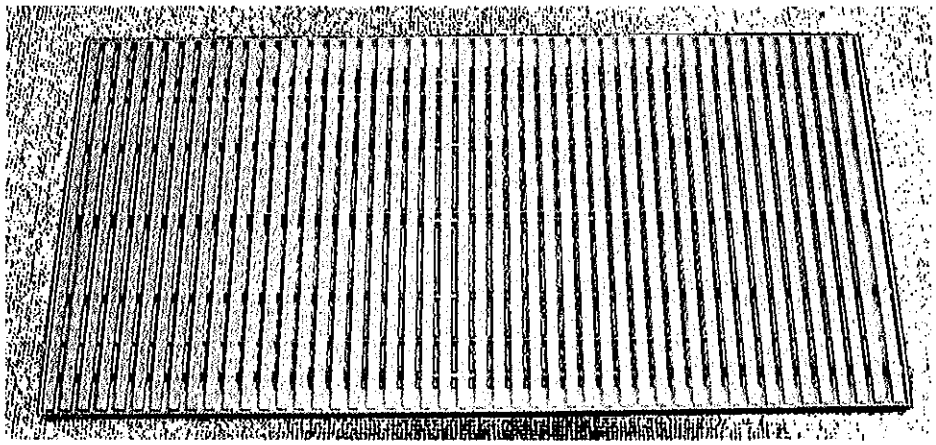
18 X 36 /54 / 72 / 90...FRAME AND GRATE

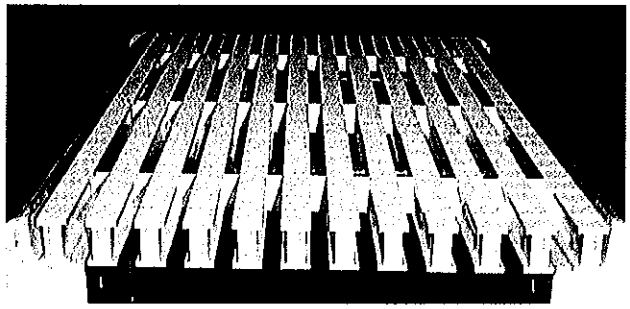
ITEM# MD-FG-CU-WT/BLK

LAWSON AQUATICS™

The Wizards of Aquatic Technology

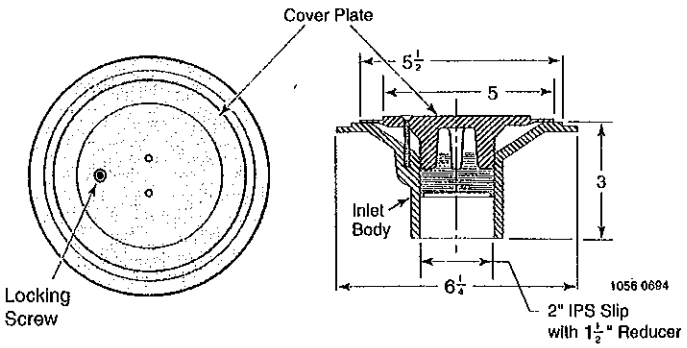
PVC MAIN DRAIN GRATE



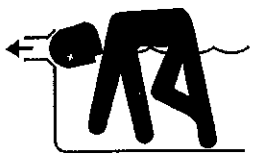


GUIDE SPECIFICATIONS

Sections of PVC UV stabilized grating, in 24" long pieces , 0.625" wide with a thickness of 1.0", connected cross-ways w/ 5/8" rods glued into place on each side w/ PVC holding caps. Each 24" section is connected end to end to accommodate the length of the straight section(s). The length is in multiples of 1 inch, the width is performed by cutting to exact measurement. Grate sections are prefabricated to arrive on-site ready to install. The space between the pieces shall not exceed 0.375" promoting maximum flow at 37.5% open area. This space is maintained by spacing arms molded as one piece with the PVC "I" Bar. The top surface shall have a raised, diamond ridge design to create good friction, wet or dry. The grate shall be fastened down per manufacturers recommendations with stainless steel anchors and screws.
The size shall be _____ long by _____ wide.

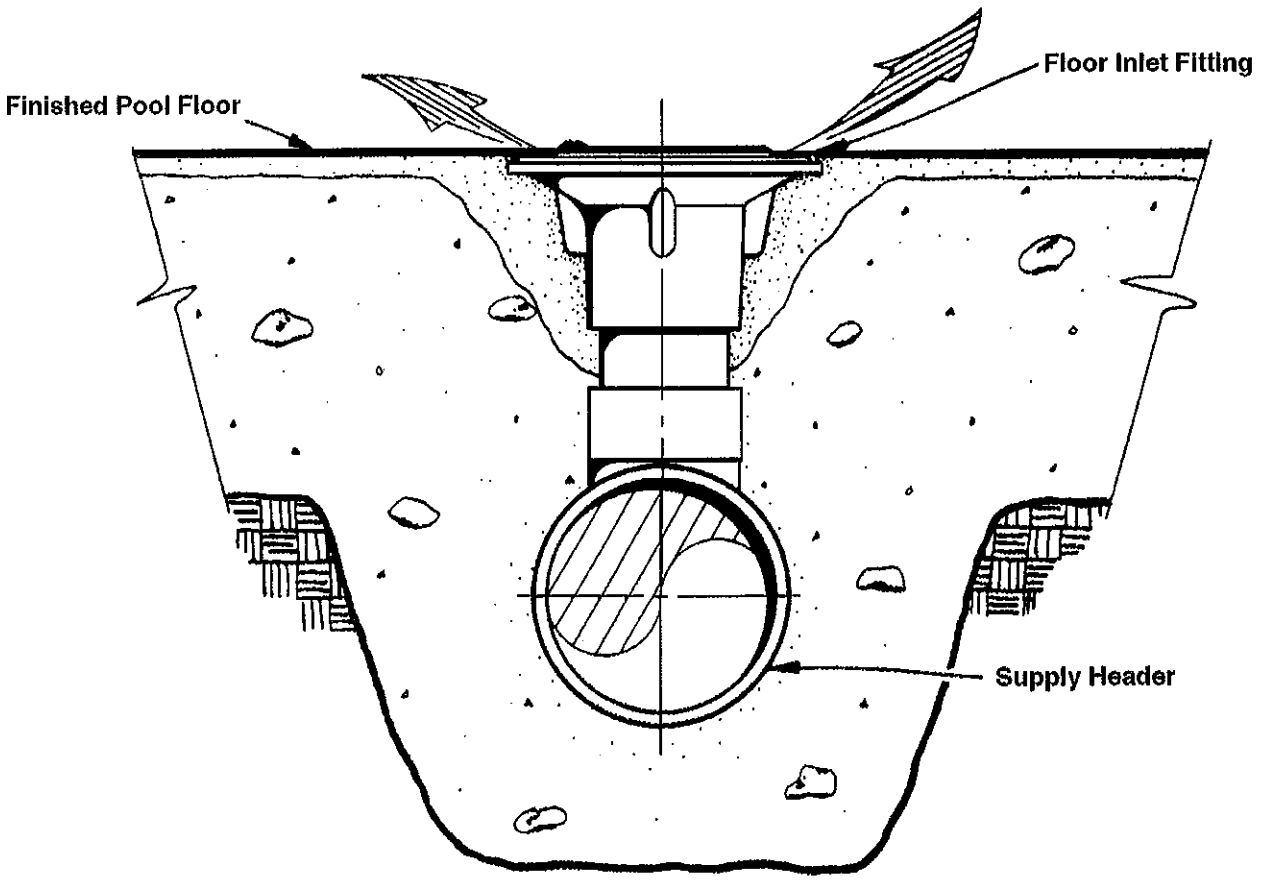


⚠ WARNING



Use of this fitting as a suction outlet is hazardous. Risk of hair or body entrapment, drowning or disembowelment.

Do not use cover on any suction or outlet fitting. Use only as an exact replacement cover on a floor inlet fitting.



(See other side of sheet for specifications)

Sta-Rite Pool/Spa Group
293 Wright St. • Delavan, WI 53115
International: 262-728-5551 • FAX: 262-728-7550
www.starite.com
Union City, TN • Delavan, WI • Mississauga, Ont., Murrieta, CA

Replacement Floor Inlet Fitting Cover ABS Plastic

Commercial Pool Catalog	Date May 1996	WC80-162 (Rev. 12/8/04)

Printed In U.S.A.

Flow Chart for 2" Floor Inlet #08417

GALLONS PER MINUTE / P.S.I. AT TURNS OPEN

TURNS OPEN	POUNDS PER SQ. INCH AT INLET																			
	.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
1/4	5	10	11	13	15	16	17	18	19	20	22	23	25	26	27	28	29	30	31	32
1/2	9	15	20	25	29	32	35	38	40	43	45	47	49	51	53	55	57	59	60	62
3/4	19	27	33	38	43	47	52	55	58	62	64	67	70	72	75	77	80	82	84	86
1	28	38	45	52	58	63	63	72	76	80	84	87	90	93	96	100	--	--	--	--
1-1/2	46	58	67	76	83	90	96	--	--	--	--	--	--	--	--	--	--	--	--	--
2	64	80	92	103	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-1/2	74	93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

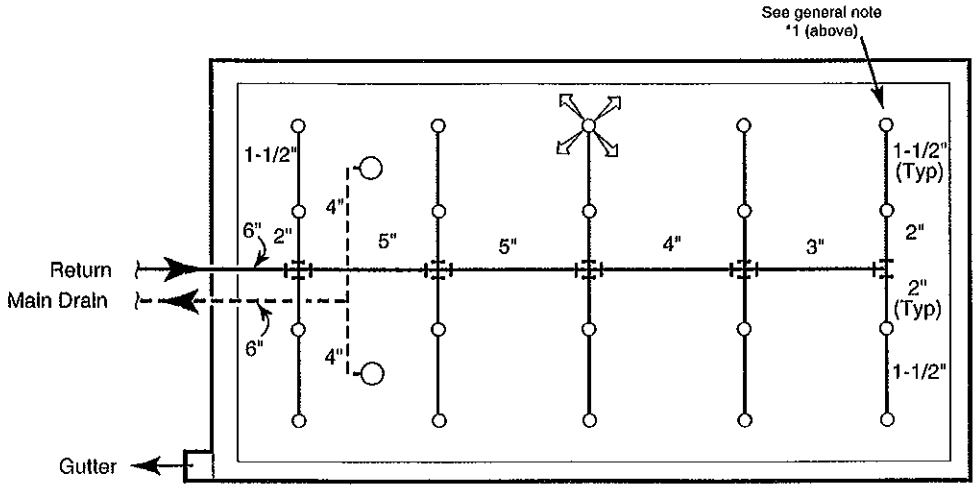
GPM

*1. In calculating head losses in return piping, design in 8 ft. of head pressure (3.47 PSI) at last inlet fitting to provide sufficient pressure throughout return system for proper distribution of heated water and chemicals.

2. All pressure return lines should be sized at 10 ft. per second velocity or less and preferably at 8 ft. per second. Copper lines should not exceed 7 ft. per second as erosion will take place at sharp turns causing serious damage to pool structure and surrounding decking if lines are buried. Check local code requirements.

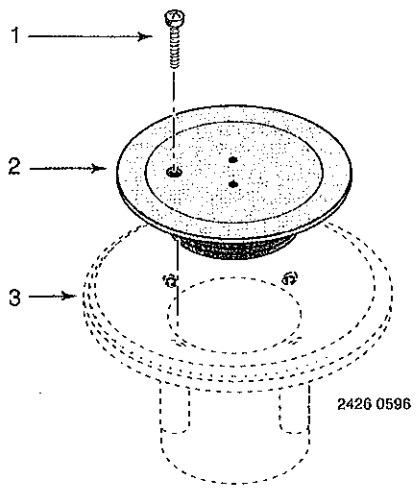
SUGGESTED LINE SIZES

FLOW RATE	SIZE
0-30	1-1/4"
30-50	1-1/2"
50-90	2"



1053 0694

Typical Floor Inlet Pool Piping Layout

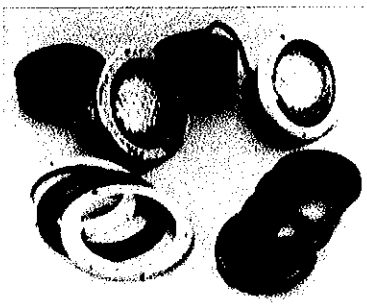


2426 0596

Key No.	Description	Qty.	Part No.
1	#8 x 1" Stainless Steel Screw	1	37207-0430
2	Cover Plate - White	1	08417-0005E
2	Cover Plate - Gray	1	08417-0005BE
2	Cover Plate - Black	1	08417-0009C
3	Body	1	Not Available

Amerlite®

Underwater Incandescent Lights with S/S Face Rings



Amerlite Incandescent Lights

Amerlite®, the world standard of reliability for underwater lights, features a stainless steel shell, 8-3/8 in. prismatic tempered glass lens, and stainless steel face ring with uni-tension clamp. Amerlites are UL listed to install in full- sized Pentair Pool Products, American, PacFab and Purex niches.

Pentair Pool Products

Featured Highlights

- World standard of reliability
- Stainless steel face ring with uni-tension clamp
- Superior light diffusion
- Prismatic tempered lens
- Gold diffused low water cutoff
- Medium blue lenses available
- Plastic snap-on face rings available for s/s lights

Catalog Ordering Information

Product	Voltage	Wattage	Cord Length (Ft.)	Carton Qty	Carton Wt (Lbs)
AMERLITE WITH STAINLESS STEEL FACE RING - 300 WATT, 120 VOLT					
78421100	120	300	15	1	6
78424100	120	300	30	1	8
78428100	120	300	50	1	10
78928400	120	300	75	1	13
78928500	120	300	100	1	15
78927000	120	300	150'	1	20
78927900	120	300	200'	1	25
AMERLITE WITH STAINLESS STEEL FACE RING - 400 WATT, 120 VOLT					
78441100	120	400	15	1	6
78444100	120	400	30	1	8
78448100	120	400	50	1	10
78948900	120	400	75	1	13
78949100	120	400	100	1	15
78447100	120	400	150'	1	20
78449100	120	400	200'	1	25
AMERLITE WITH STAINLESS STEEL FACE RING - 500 WATT, 120 VOLT					
78451100	120	500	15	1	6
78454100	120	500	30	1	8
78458100	120	500	50	1	10
78958300	120	500	75	1	13
78456300	120	500	100	1	15
78457100	120	500	150'	1	20
78459100	120	500	200'	1	25
AMERLITE WITH STAINLESS STEEL FACE RING - 100 WATT, 12 VOLT					
78411100	12	100	15	1	6
78414100	12	100	30	1	8
78418100	12	100	50	1	10
78412500	12	100	75	1	13
78415100	12	100	100	1	15

www.pentairpool.com
www.staritepool.com

1620 Hawkins Avenue, Sanford, NC 27330 • Tel 800-831-7133 • Fax 800-284-4151
10951 West Los Angeles Avenue, Moorpark, CA 93021 • Tel 800-831-7133 • Fax 800-284-4151

Pentair Large Stainless Steel Niches

Niches for Swimming Pools and Spas

Pentair Large Niches

Pentair Water Pool and Spa

Large stainless steel niches are formed with brass fittings. All niches have internal and external grounding lugs for use with either metal or PVC conduit.

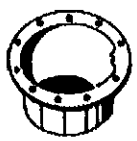
Featured Highlights

- Niches for all installations
- Stainless steel housing
- Brass hub: 1/2, 3/4, or 1 in.
- Internal/external bonding lugs
- Vinyl niches with chrome/brass sealing rings
- Sandwich gasket for vinyl
- Powder coated sealing ring (optional)

Catalog Ordering Information

Product	Description	Carton Qty	Carton Wt (Lbs)
	LARGE STAINLESS STEEL NICHES FOR CONCRETE INSTALLATION		
78210200	1/2 in. top hub	12	3
78210300	1/2 in. rear hub	12	3
78210400	3/4 in. top hub	12	3
78210500	1 in. top hub	12	3
78210600	1 in. rear hub	12	3
78210700	3/4 in. rear hub	12	3
	VINYL AND FIBERGLASS INSTALLATION,STANDARD 10 HOLE PATTERN		
78232400	Fiberglass/liner, 3/4 in. rear hub	12	5
78232500	Fiberglass/liner, 1 in. rear hub	12	5
	LARGE STAINLESS STEEL NICHE, CONCRETE SHIELD		
45361000	Niche Shield for construction	1	0.325
79211600	Niche plaster ring	1	5
	POWDER COATED SEALING RINGS,VINYL/FIBERGLASS		
79200255	Sealing ring, large niche	1	0.01
	SCOTCHCAST SEALANT FOR NICHE BONDING LUGS		
60028300	Scotchcast™ 2135 Sealant	1	0.0375

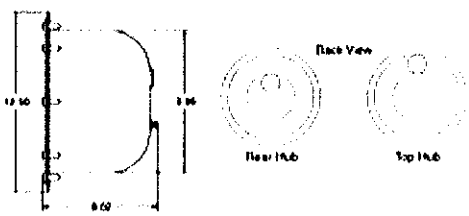
UL LISTED



Standard 10 Hole Pattern

Gunite Hole Pattern

Notice: Underwriters Laboratories has listed Pentair Pool Products lights for use with Pentair Pool Products, American Products, Purex, or PacFab niches only. To ensure proper grounding/bonding connections install only Pentair Pool Products lights in Pentair Pool Products, American Products, Purex, or PacFab niches.



See page 509 for replacement parts.

www.pentairpool.com
www.staritepool.com

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10951 West Los Angeles Avenue, Moorpark, CA 93021 • Tel 800-831-7133 • Fax 800-284-4151

HYDREL

An AcuityBrands Company

JB1719 DECK MOUNT JUNCTION BOX

TYPE	JOB NAME

PART NUMBER

Model	Conduit Entries-End	Conduit Entries-Side	Conduit Entries-Side	Conduit Entries-Bottom	Conduit Entries-Side	Accessories

DESCRIPTION:

The JB1719 deck mount junction box is designed for deck or remote wall mounting for connection of underwater lighting fixtures and service conduits. This cast bronze box has integral ground lugs and silicone gasket. The entire bottom and two sides of the box are suitable for special entry drilling as required.

MATERIAL: Heavy wall cast bronze. Natural finish.

GASKET: Silicone.

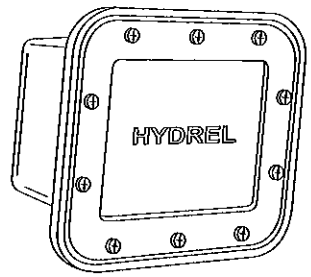
ENTRIES: Bottom, end, and side entries available. Special drilling also available upon request.

VOLUME: 62 cubic inches (1,016 cubic cm.)

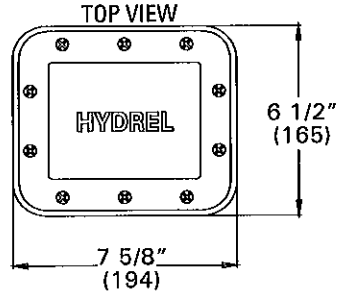
FASTENERS: Stainless steel.

ACCESSORIES: Re-enterable potting compound.

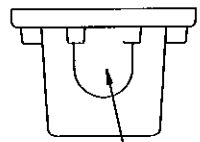
LISTING: U.L., C.S.A.



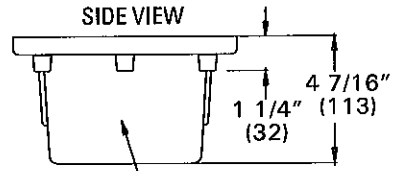
TOP VIEW



END VIEW



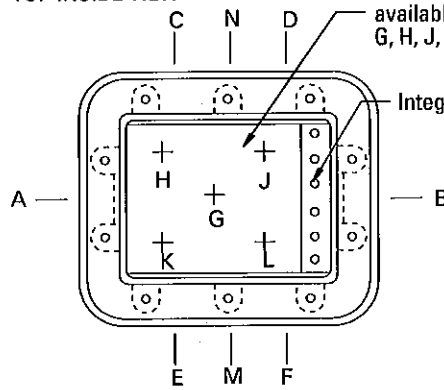
SIDE VIEW



Single entry available each end at locations A and B

Maximum three (3) entries available each side at locations C, D, E, F, M and N

ENTRY LOCATIONS TOP INSIDE VIEW



Maximum of five (5) bottom entries available at locations G, H, J, K, and L

Integral ground lugs

APPROVALS

NOTE: HYDREL RESERVES THE RIGHT TO MODIFY SPECIFICATION WITHOUT NOTICE. Any dimension on this sheet is to be assumed as a reference dimension: "Used for information purposes only. It does not govern manufacturing or inspection requirements." (ANSI Y14.5-1973)

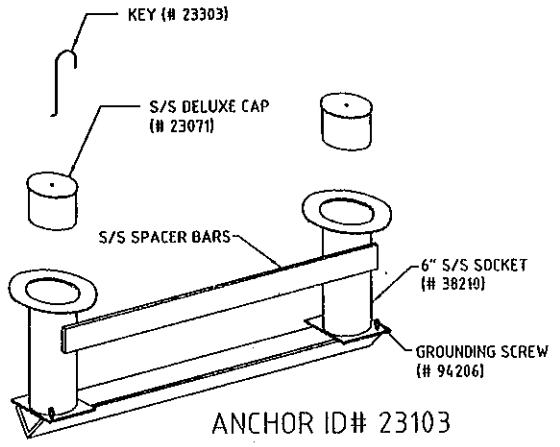
Hydrel is an ISO 9001 Certified Manufacturer

10/10/07
JB1719

12881 Bradley Ave
Sylmar, CA 91342
Phone: 818-362-9465
Fax: 818-362-6548
www.hydrel.com

6" Competitor Anchor Assembly
Setting Procedure for NEW DECKS

1. Locate approximately where the starting platforms are to be installed (refer to Figure 1 below). This will be at the 'B' dimension back from the pool wall and at the center of the lane. NOTE: The center of the anchor socket should not be located closer than 5" to joints, trenches, curbs, drains or anything else that disrupts the continuity of the slab. A firm bond between the anchor and the slab must be created and maintained to provide the necessary strength to support the platform.
2. The 'B' dimension can vary and is dependent on the specific Competitor style starting platform used. Refer to proper specification sheet for make and model number of platform for correct 'B' dimension or consult with your Distributor for assistance.
3. Remove the cover caps & keys from the anchor sockets and store in a safe place. Verify the center to center dimension between the socket bodies to be $19\frac{1}{2}$" as the anchors may have been damaged (misaligned) during transit.
4. Prop and secure the socket assembly at the correct location and height. The center of the sockets must be set at the exact 'B' dimension as measured from the pool wall. The top of the socket must be flush with the finished face of the pool deck. See Figures 1 and 2 for reference.
5. Properly bond/ground the anchor at this time.
6. Mix enough concrete to set the assembly into the sub-grade to correctly position the anchor (approximately 1" up in the concrete footing). Use enough mixture to ensure that the assembly will not move during the deck pour.
7. Verify that the sockets are level and square in both directions and properly in line.
8. The concrete footing (with socket assembly in place) should be allowed to set/cure prior to the deck pour.
9. Recheck location and level of all sockets before pouring deck.
10. Once deck has fully cured, install starting platforms or replace socket cover caps.



ANCHOR ID# 23103

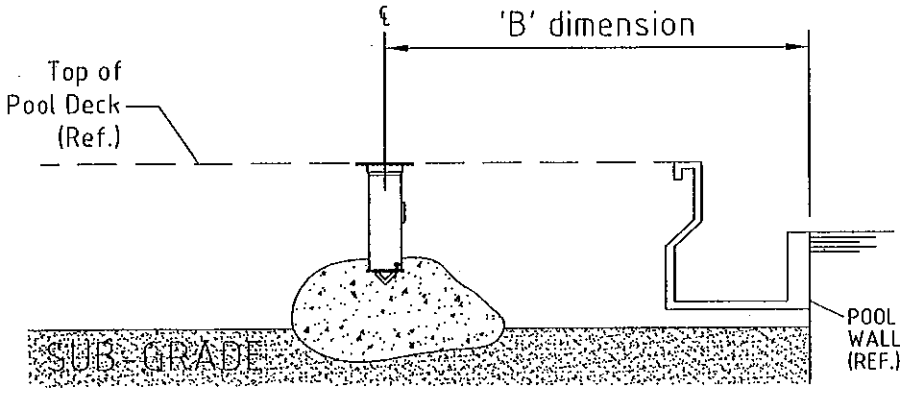


Figure 1: Side Pool Profile with anchor setback.

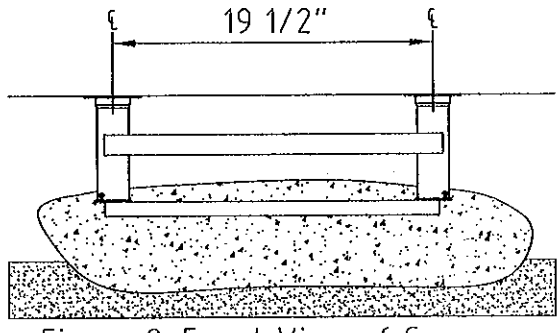


Figure 2: Front View of Core.

Supersedes Installation Instructions dated 6/28/02

PARAGON AQUATICS
1351 Route 55
LaGrangeville, NewYork
12540
Phone: (845) 452-5500
Fax: (845) 452-5426

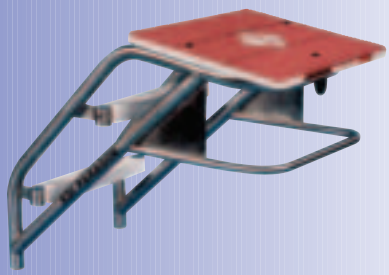
Drawn by: MC	Date: 5/7/03	Approved by: SW	Date: 5/7/03
Title: 6" COMPETITOR ANCHOR INSTALLATION INSTRUCTIONS			
Drawing Number: II-23103		Rev Ltr: B	Sheet: 2 of 2

Full Height

Dual Leg (Competitor)

The Competitor platform (dual leg models) is our premier starting platform. This versatile design accommodates our standard tops (24" x 20") as well as our track start tops (32" x 24"). The competitor style platforms provide the ease of including our exciting graphics to your top. All Competitor anchor systems (patented) offer the feature of installing the platform without tools and come in two types of anchor assemblies, 6" Competitor (for anchor setbacks of under 30") or 10" Competitor (for anchor setbacks of over 30"). All starting platforms are provided with anchors unless otherwise specified. Platform top consists of a 1-1/4" thick UV inhibited polypropylene top with patent-pending, cross-grooved, non-skid, white sand finish. Colors and graphics are an option.

Long Reach Standard Competitor (B = 20"-29-1/2")
Designed to accommodate most pool profiles. The anchor setback ("B" dimension) range is 20" to 29-1/2". Uses 6" Competitor Anchor I.D. No. 23103
Spec Sheet SP 10.60.1



Long Reach Standard Competitor (B = 30"–40")
For pools with wide overflow gutter systems. The anchor setback ("B" dimension) range is 30" to 40". Uses 10" Competitor Anchor I.D. No. 23140
Spec Sheet SP 10.60.2

Our highly regarded Track Start Competitor Models (available in side step and rear mount) give swimmers an extra fast takeoff. The 32" x 24" top supports the "track-type" start now used by many competitive swimmers.

Track Start Competitor Side Step Full Height
The anchor setback ("B" dimension) is available at 18" or 24". Uses 6" Competitor Anchor I.D. No. 23103

B= 18", A < 24 1/2" – Spec Sheet SP 10.60.3
B= 18", A > 24" – Spec Sheet SP 10.60.4
B= 24", A = 17"-31"– Spec Sheet SP 10.60.5

Long Reach Track Start Competitor Rear Mount
The anchor setback ("B" dimension) is available from 36" to 40". Uses 10" Competitor Anchor I.D. No. 23140
B= 36"- 40" – Spec Sheet SP 10.60.6

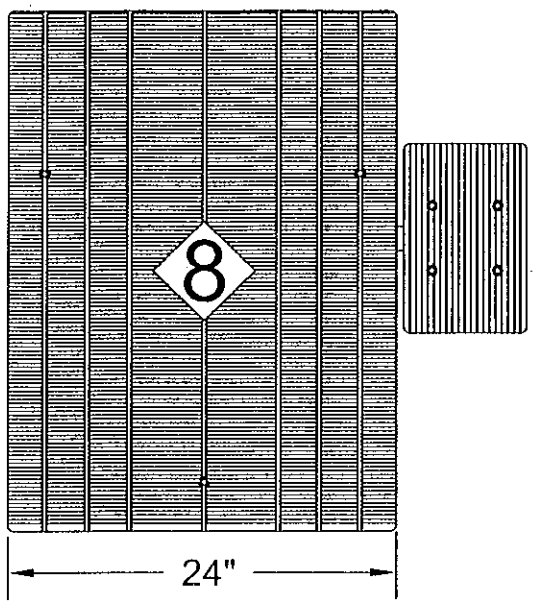
Classic Standard Competitor
This Dual Leg design utilizes the standard size top (24" x 20") and offers the opportunity to add graphics. The anchor setback ("B" dimension) is fixed at 18". Uses 6" Competitor Anchor I.D. No. 23103
Spec Sheet SP 10.59

Note: All platforms are furnished with a tilted top unless otherwise specified.

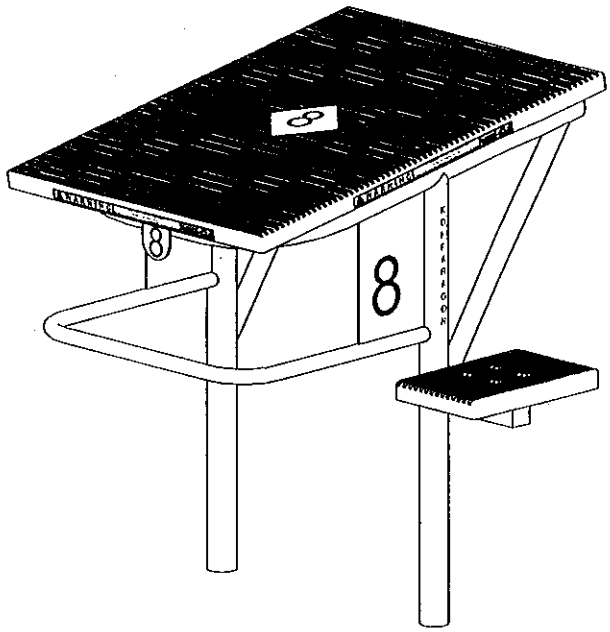
WARNING: Starting Platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

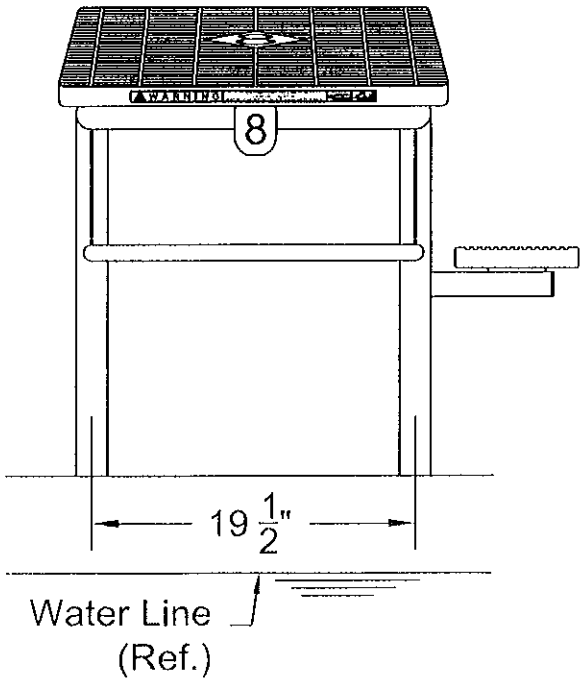
56

Track Start Side Step Platform (A Less Than 24 1/2", B=18")

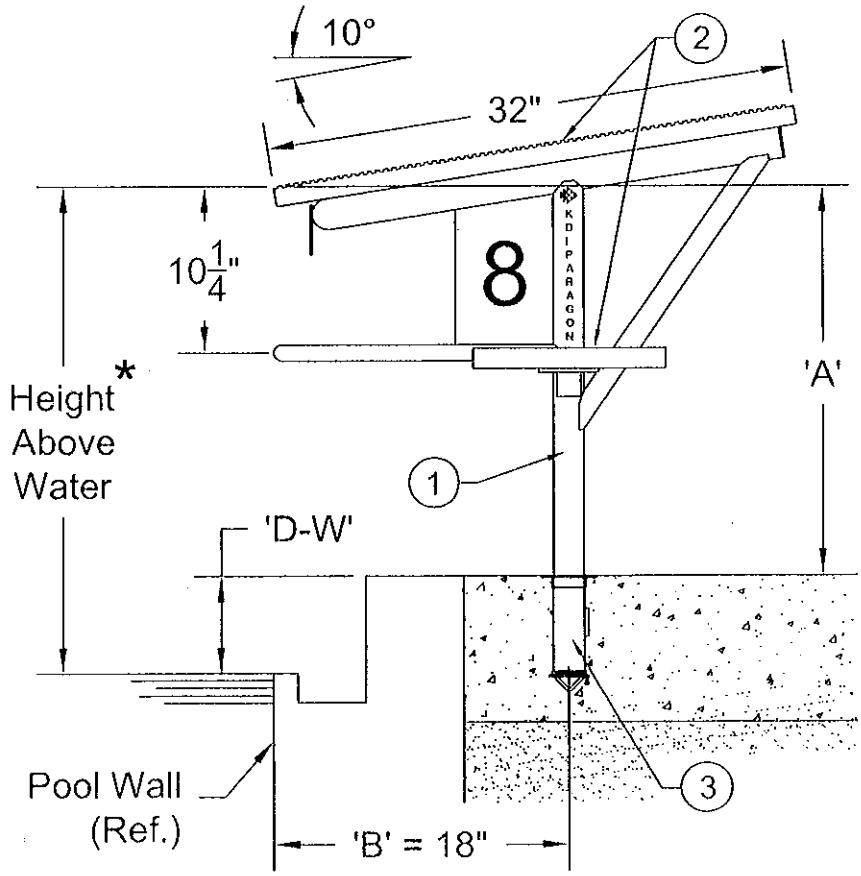


PLAN VIEW





FRONT VIEW



SIDE VIEW

PARAGON AQUATICS
Pentair Water
Commercial Pool & Aquatics

1351 Route 55
LaGrangeville, New York
12540
Phone: 845-463-7200
Fax: 845-463-7291
www.paragonaquatics.com

Drawn by: SF	Date: 6/27/08	Approved by: RV	Date: 6/27/08		
Sheet Title: Track Start Side Step Platform					
Drawing Number: SS-SP10.60.3		Revision Letter: C		Sheet: 1 of 2	

INSERT SHT.

Track Start Side Step Platform (A Less Than 24 1/2", B=18")

Specifications

1. The Track Start Side Step starting platform shall have an elevated platform top supported by a sloping stainless steel frame. The platform frame shall be manufactured of 1.90" diameter x .109" wall thickness Type 304 stainless steel polished to a 320 grit finish. The platform posts shall be reinforced with a welded 1.66" diameter x .140" wall thickness Type 304 stainless steel insert. The backstroke bar shall be made of 1" diameter x .065" wall thickness Type 304 stainless steel polished to a 320 grit finish, and located in a range consistent with all ruling bodies. The backstroke bar and step support shall be fully welded to the pedestal.

2. The platform top (24" wide x 32" deep) and intermediate step (8" x 12") shall be constructed of UV inhibited high density polypropylene. They shall have a dual non-skid cross-grooved with a sand textured finish surface. The top shall be permanently positioned at a 10° tilt towards the pool.

3. The platform shall be anchored to the patented taper-lock 6" Competitor anchor socket, ID #23103, and shall be removable without the use of tools.

General

The stainless steel frame shall be electro-chemically passivated on all worked areas for maximum corrosion resistance. All hardware shall be 18-8 stainless steel. Custom designs and modifications are available upon request.

Selector Chart

'A'	'B'	Identification # Complete w/ Anchor	Less Anchor
24"	18"	**24515**	24515-A
23 1/2"	18"	**24516**	24516-A
23"	18"	**24517**	24517-A
22 1/2"	18"	**24518**	24518-A
22"	18"	**24519**	24519-A
21 1/2"	18"	**24520**	24520-A
21"	18"	**24521**	24521-A
20 1/2"	18"	**24522**	24522-A
20"	18"	**24523**	24523-A
19 1/2"	18"	**24524**	24524-A
19"	18"	**24525**	24525-A
18 1/2"	18"	**24526**	24526-A
18"	18"	**24527**	24527-A
17 1/2"	18"	**24528**	24528-A
17"	18"	**24529**	24529-A

Sizing Infomation (See drawing on reverse side)

1- "A" dimension shall be the vertical dimension from the top of the anchor socket at deck level to the top front edge of the platform top.
2- "B" dimension shall be the horizontal dimension from the pool wall to the center of the anchor socket.
3- "D-W" dimension shall be the vertical dimension from water level to the top of the anchor socket at deck level.
*- See specification sheet SS-SP10.50 for important information regarding platform sizing requirements and how to order.

Accessories

ID Number	Description
23102	6" Competitor anchor socket, individual
23103	6" Competitor anchor socket assembly
23104	Setting jig for competitor anchor assembly
23990C	Color upgrade (per unit) for sand finish top
23991	Custom Logo Upgrade
23967	Safety cover for platforms with 24" x 32" tops

WARNING : Starting platforms are to be used only by trained competitive swimmers. Only shallow racing dives should be executed. Impact with the pool bottom can cause serious injury. Please refer to applicable codes and regulations for your specific installation.

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Drawn by: SF	Date: 6/27/08	Approved by: RV	Date: 6/27/08		
Sheet Title: Track Start Side Step Platform					
Drawing Number: SS-SP10.60.3		Revision Letter: C		Sheet: 2 of 2	

Pool Accessories

Paragon Aquatics Backstroke Flag Color Selection

Pennant Lines

Triangular pennants of alternating colors spaced according to regulations. Pennants and line are of synthetic materials. Specify pool width when ordering-5'0" extra will be provided at each end to reach to stanchions. Also specify colors desired. Standard colors are navy blue, Dartmouth green, royal blue, teal, brown, gray, orange, yellow, silver, red, medium blue, light blue, mauve, kelly green, maroon, and purple. Also in black and white (not shown). Custom lettering is available upon request.

Finish Line 18" x 30" pennants
I.D. No. 40101

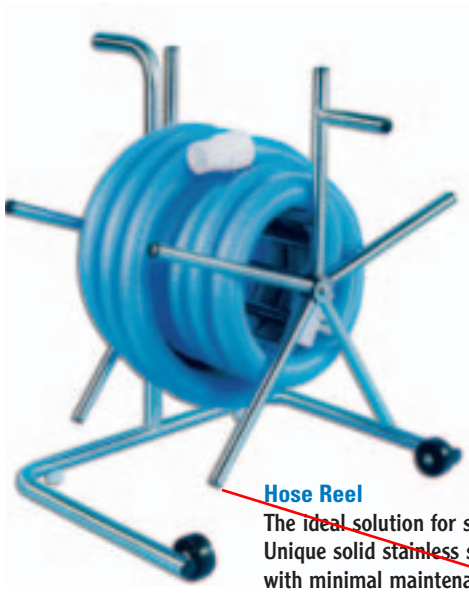
Backstroke Line 12" x 18" pennants
I.D. No. 40102
Spec Sheet AA 20.67

Stanchions

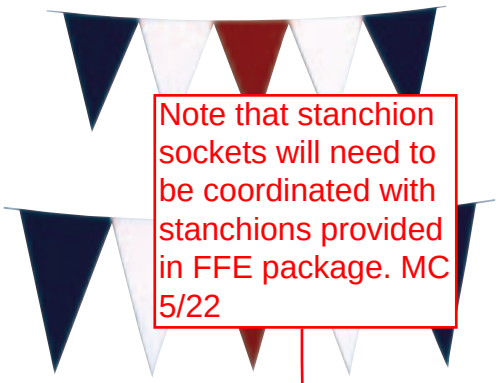
For supporting backstroke lines, finish lines, recall lines and splash curtains. They are made of stainless steel tube, capped at one end with a T304 stainless steel closure plate and U-hook. A sliding collar with eye bolt is optional and can include one or two eye bolts per collar.

Material	Stanchion Height 4'-6" I.D. No.	Stanchion Height 8'-0" I.D. No.
1.90" O.D. .065" wall	38101	38102
.109" wall	38103	38104
.145" wall	38105	38106

Sliding Collar with Eye Bolt
I.D. No. 38301
Spec Sheet AA 20.67



Backstroke Line



Note that stanchion sockets will need to be coordinated with stanchions provided in FFE package. MC 5/22

Stanchion Sockets

For stanchions and water polo goals. Three styles are available. Cast bronze with slip-fit cap (or threaded cap) plus stanless steel with slip-fit cap.

Stanchion Socket, Bronze (Threaded Cap)
I.D. No. 38201-TC

Key for Bronze Threaded Cap
I.D. No. 38202

Stanchion Socket, Bronze (Slip-Fit Cap)
I.D. No. 38201

Stanchion Socket, Stainless Steel (Stainless Steel Cap)
I.D. No. 38210
Spec Sheet AA 20.67

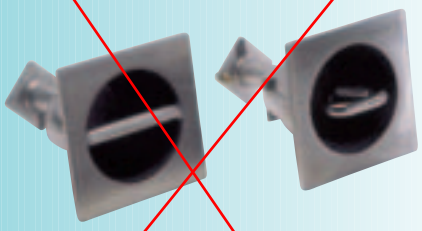
Key for Slip Fit Cap
I.D. No. 23303

Hose Reel

The ideal solution for storing unsightly and cumbersome pool vacuum hose. Unique solid stainless steel construction ensures years of trouble-free use with minimal maintenance. Reels hold up to 100 feet of 2" diameter hose. Units are portable and designed to fit through a standard door. Vacuum hose stores conveniently.
I.D. No. 75151
Spec Sheet PA 40.03

Pool Accessories

Stainless Steel Commercial Cup Anchors
Anchored into pool wall for use with racing lanes and life lines. New cast stainless steel cup anchor with integral bar or triangular eye bolt for attaching multiple lanes.



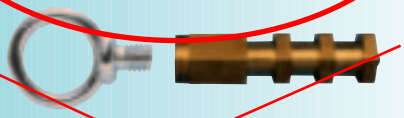
Cup Anchor with Integral Anchor Bar
I.D. No. 70316SS

Cup Anchor with Triangular Eye Bolt
Eye Bolt is removable and replaceable
I.D. No. 70316SE

Triangular Eye Bolt
I.D. No. 70321

Heavy Duty Eye Bolt
I.D. No. 70317

Threaded Wall Insert for Heavy Duty Eye Bolt
I.D. No. 70318



Standard Eye Bolt
I.D. No. 70319

Threaded Wall Insert for Standard Eye Bolt
I.D. No. 70320

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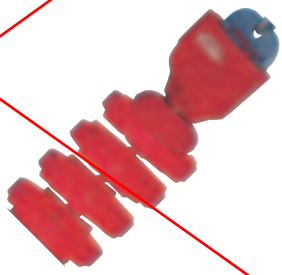
COMPETITOR® Anti-Turbulent Racing Lanes
Lanes are required for competitive swimming to separate racing lanes and to dampen turbulence. Continuous 4" diameter flow-through design discs of alternating colors are strung on a vinyl-covered stainless cable. Complete with end hooks and tensioning devices. Storage reel will hold seven 25-yard, six 25-meter or three 50-meter lanes. Standard colors are red, yellow, blue, green, brown, orange, purple, white, maroon, and black.

Lane Length	I.D. No.
60 feet	76101-1
25 yard	76102-1
25 meter	76103-1
50 meter	76104-1
25 meter (w/disconnect)*	76105-1
50 meter (w/disconnect)**	76106-1
Storage Reel	76107-1
Take-up Reel	76118-1
Ratchet Wrench	76119-1



* 7' disconnect yields 25 yard lane.
** Yields 2 equal 25 meter or 25 yard lanes.

Paragon Lane Storage Reel
Lightweight yet rugged stainless steel construction with zinc plated individual, double lock casters. Holds up to 650 feet of 4" lane lines and requires little maintenance. Ideal for commercial and institutional pools.

Standard Model holds up to 540 feet of 4" lanes
I.D. No. 75101

Standard Model with stainless steel casters
I.D. No. 75101SS

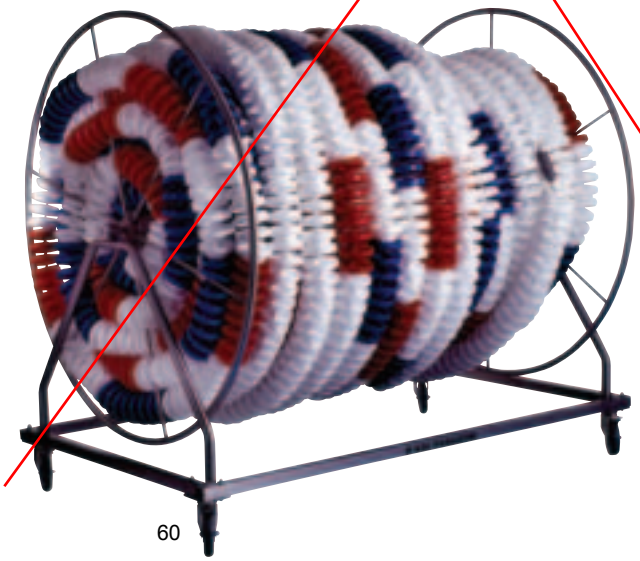
Large Capacity model holds up to 650 feet of 4" lane
I.D. No. 75111

Large Capacity model with stainless steel casters
I.D. No. 75111SS

Lane Storage Reel Cover
Heavy-duty construction in blue 16 oz. textured vinyl. All seams are double stitched with white polyester thread. Fits all KDI Paragon lane reel models.
I.D. No. 75133
Spec Sheet PA 40.01

Replacement stainless steel casters
I.D. No. 75103SS

Replacement zinc plated casters
I.D. No. 75103



60

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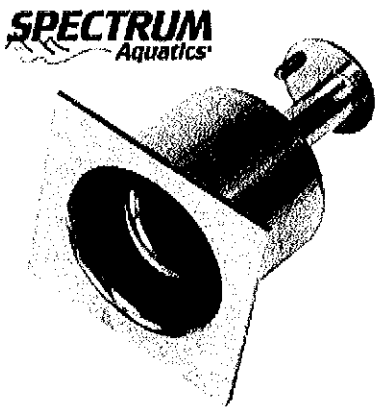
Stainless Steel Cup Anchor



QUANTITY:

Product #: 58316 SS

This anchor is fabricated of 304-stainless steel. It employs a removable 18-8, stainless steel eyebolt. All components are electro polished and passivated following fabrication. They are intended for installation into concrete and gunite pools and include a bonding screw. They may be utilized for securing racing lane lines and/or safety ropes.

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Lifeguard Chairs

Lifeguard Chair Seat
One piece molded fiberglass reinforced, turquoise, plastic seat with stainless steel mounting bolts.
I.D. No. 20701

Swivel Chair Seat Support
Stainless steel welded assembly ready for installation. Designed to render proper seating angle when mounted to plastic seat. Has 360° swivel capability with bearing surface of low friction non-metallic disc to prevent seizing or binding due to corrosion. Rugged construction.
I.D. No. 20702

Anchor Socket for anchoring all deck equipment (except rear legs of diving towers and stands, starting platforms, and stanchions). Cast bronze with locking bronze wedge and stainless steel bolt.
I.D. No. 28102

Anchor Socket Cover
Sold Separately
I.D. No. 28104

Escutcheon Plates to cover anchor sockets. Fit 1.90" OD tubing. The deluxe unit is a chrome-plated bronze casting.
Escutcheon Plate, Deluxe
I.D. No. 28301

The standard escutcheon is a stainless steel stamping to fit 1.90" OD tubing. Escutcheon Plate–Stainless Steel, Standard I.D. No. 28302
Spec Sheet AA20.29

Standard
Our original, basic guard chair. The seat, backrest, and non-skid footrest are fabricated of laminated wood coated with fiberglass and polyester resin. The frame is constructed of stainless steel tube and ABS steps. Platform height is 4'4" and seat height is 6'0" above the deck. Furnished with a 19" step and holders for rescue tube and umbrella. Optional anchors and escutcheon plates available.
I.D. No. 20601
Spec Sheet LG 20.35

Rover SemiPermanent
Designed for those pools where the lifeguard chair must be anchored, yet still be capable of being readily moved. (In Sunbelt states chair might be moved to opposite sides of the pool each day to keep the sun out of the guard's eyes.) The rear legs are set into sockets anchored in the deck, while the front legs with 7" diameter wheels allow for easy relocation. Ladder has 19" steps. Furnished with two pairs of anchor sockets (for two locations), additional sets must be ordered separately.
I.D. No. 20303
Spec Sheet LG 20.33

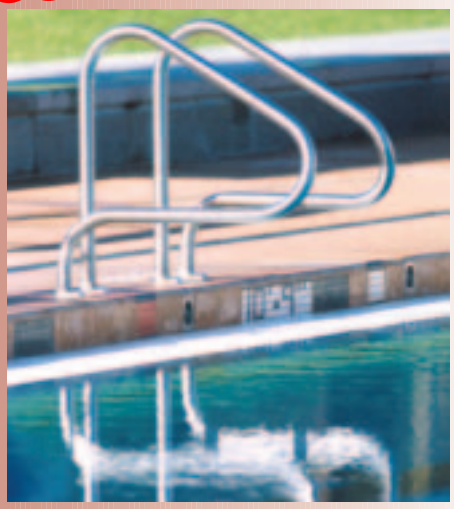
Moveable (Wheel-A-Round)
An ideal solution for a chair that is needed at different locations. Both rugged and stable, yet can be easily moved by one person. The heavy duty 7" diameter wheels roll easily on deck or lawn. The perfect chair for supervision, instruction, and judging. The wide ladder at front leads directly to platform. Furnished with 26" steps. Available with seat at eight-feet or six-feet above deck. (Not suitable for diving.)
8-feet I.D. No. 20301
Spec Sheet LG 20.39-8
6-feet I.D. No. 20302
Spec Sheet LG 20.39-6

Grab Rails

Grab rails come in pairs. They are used to keep racing lanes free of obstructions when used in conjunction with built-in steps.

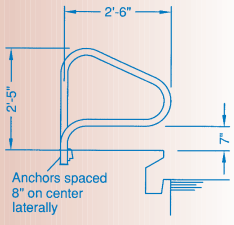
Stainless Steel Recessed Step (15"W x 5"H x 5"D) sets flush in wall. Built-in step is grouted into a rough hole and has a sloped tread to promote drainage. Polished, corrosion-resistant, non-skid sand blasted bottom tread for added traction. Recommended for use in all climates.
I.D. No. 32104

Frostproof Recessed Step (15-1/2"W x 5"H x 5-1/2"D) is heavy duty, foamed plastic without projecting lip. Textured bottom tread for added traction. Built-in step is grouted into a rough hole. Specifically recommended for use in freezing climates. White.
I.D. No. 32102



Long Reach Pretzel

Similar to standard pretzel but recommended for installations with wide gutters. Legs are offset laterally to accommodate joints or obstructions in the pool deck.
.145" wall – I.D. No. 30211
.109" wall – I.D. No. 30212
.065" wall – I.D. No. 30213
Spec Sheet GR 20.50



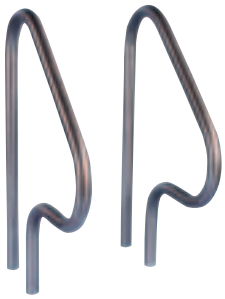
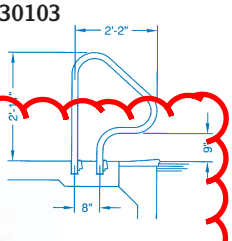


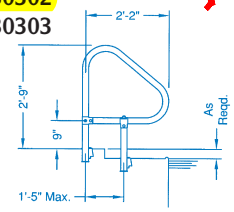
Figure 4

Our most popular model. For flat deck without unusual curbs or coping.
.145" wall – I.D. No. 30101
.109" wall – I.D. No. 30102
.065" wall – I.D. No. 30103
Spec Sheet GR 20.41



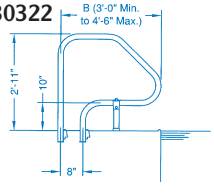
Adjustable Figure 4

Front leg is adjustable in field so it can be set atop curbs or into gutters. Choose this model when unusual conditions will not permit use of Figure 4 style.
.145" wall – I.D. No. 30301
.109" wall – I.D. No. 30302
.065" wall – I.D. No. 30303
Spec Sheet GR 20.45



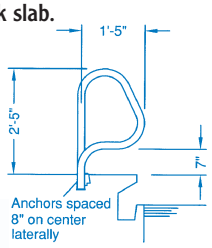
Long Reach Adjustable

Available in sizes to fit extra-wide gutter systems in the increasingly popular "fast-pool" design concept. Specify "B" dimension. Custom fabricated to pool profile.
.145" wall – I.D. No. 30320
.109" wall – I.D. No. 30321
.065" wall – I.D. No. 30322
Spec Sheet GR 20.49



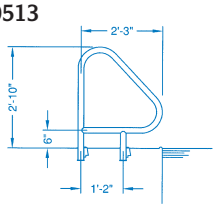
Pretzel Bend

Requires the least amount of deck width with the narrowest profile as the legs are offset laterally instead of front to back. Can usually be mounted on pool wall rather than the deck slab.
.145" wall – I.D. No. 30201
.109" wall – I.D. No. 30202
.065" wall – I.D. No. 30203
Spec Sheet GR 20.43



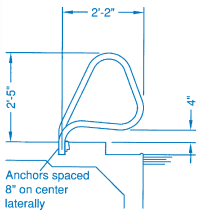
Welded Figure 4

If you furnish specific deck and gutter dimensions we can supply our Adjustable Grab Rail styling as a fixed, fully-welded unit.
.145" wall – I.D. No. 30511
.109" wall – I.D. No. 30512
.065" wall – I.D. No. 30513
Spec Sheet GR 20.46



California

Made extra-wide to clear wide gutters or when deck-to-water distance is exceptionally great. Legs offset laterally to minimize deck width requirements. Front end dips downward for a shorter reach for low water level pools.
.145" wall – I.D. No. 30401
.109" wall – I.D. No. 30402
.065" wall – I.D. No. 30403
Spec Sheet GR 20.47

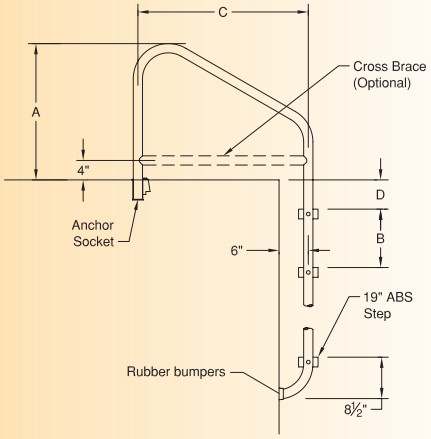


Vertical Ladders

The ladders shown on these pages offer the most convenient method of pool entry wherever stairs cannot be used. Each ladder comes standard with two frames and injection molded ABS-UV inhibited steps bolted between them. They can also be provided with stamped stainless steel steps upon request. All frames are made of corrosion resistant T304 stainless steel, 1.90" OD tube and provide ample length for a 4" anchor penetration. The bolts have contoured heads curved to fit the tubing of the frames. All ladder styles with frames resting against the pool wall have rubber bumpers to prevent damage to the wall. All vertical ladders are similar in appearance and vary only in:

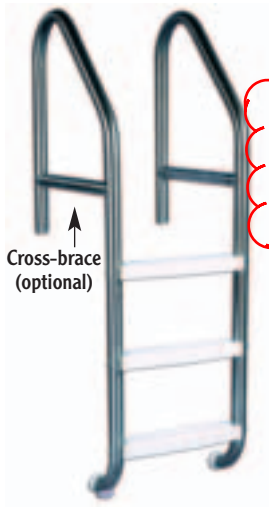
– Wall thickness of tubing (.065", .109" or .145")
– Width of frames from front to back (24", 29", or 35")
– Number of steps (2 to 5)
– Florida and Therapy styles

Anchor sockets and escutcheon plates are not included with ladders and must be ordered separately.



Ladder Reference Dimensions With and Without Cross Brace

	A	B	C	D
Heavy Duty	28"	12"	24", 29", 35"	6"
Deluxe	28"	12"	24", 29"	6"
Florida	32"	12"	36"	4"



Heavy Duty (.109" or .145" wall thickness). For commercial and institutional use. Made only in thicker grades of stainless steel to withstand heavier usage.
Spec Sheet LD 30.01

Heavy Duty with Cross Brace Recommended for heavy duty commercial use at public and institutional pools. Reinforced with cross braces for extra rigidity and strength.
Spec Sheet LD 30.03

Florida Style Offered in 3 grades (.065", .109", or .145" wall thickness). Extends extra high over deck to clear the 6" curb required on all Florida pools.
Spec Sheet LD 30.02

Florida Style with Cross Brace Same as Florida Style but with cross braces for extra rigidity.
Spec Sheet LD 30.04

Deluxe (.065" wall thickness). Recommended for residential pools and light commercial use. Ladder frames go slightly deeper into water and extend slightly higher above deck compared to normal residential ladders. Recommended only for concrete or vinyl-lined pools.
Spec Sheet LD 30.01

Heavy Duty Ladders

	24" Width		29" Width		35" Width		**Deluxe Ladders** 24" W	29" W
	.145"	.109"	.145"	.109"	.145"	.109"	.065"	.065"
2 Step	42201	42213	42205	42217	42209	42221	42301	42305
3 Step	42202	42214	42206	42218	42210	42222	42302	42306
4 Step	42203	42215	42207	42219	42211	42223	42303	42307
5 Step	42204	42216	42208	42220	42212	42224	42304	42308

Cross Braced Ladders

	24" Width			29" Width			35" Width		
	.145"	.109"	.065"	.145"	.109"	.065"	.145"	.109"	.065"
2 Step	42101	42113	42125	42105	42117	42129	42109	42121	42133
3 Step	42102	42114	42126	42106	42118	42130	42110	42122	42134
4 Step	42103	42115	42127	42107	42119	42131	42111	42123	42135
5 Step	42104	42116	42128	42108	42120	42132	42112	42124	42136

Florida Style Ladders — 36" Width

	.145"	.109"	.065"
2 step	42519	42515	42511
3 Step	42520	42516	42512
4 Step	42521	42517	42513
5 Step	42522	42518	42514

Florida Style with Cross Brace — 36" Width

.145"	.109"	.065"
42159	42155	42151
42160	42156	42152
42161	42157	42153
42162	42158	42154

Therapeutic Ladder (shown with Safety Wedge)
Designed for hospital and/or handicapped treatment pools. Sloping design, handrails and steps spaced 10" apart permit easy entry by the elderly or infirm. If dimension from deck to pool floor is:

18" to 27" use 2-step
28" to 37" use 3-step
38" to 47" use 4-step
48" to 57" use 5-step

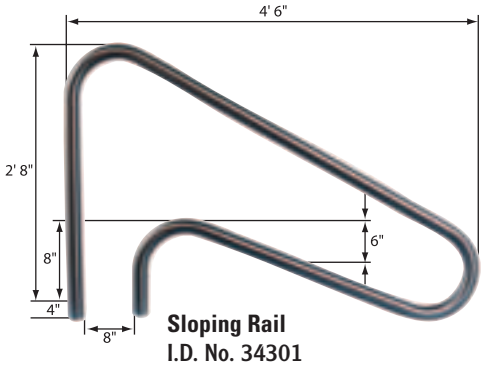
	.145"	.109"	.065"
2 step	42701	42705	42709
3 step	42702	42706	42710
4 step	42703	42707	42711
5 step	42704	42708	42712

Spec Sheet No. TA 30.21

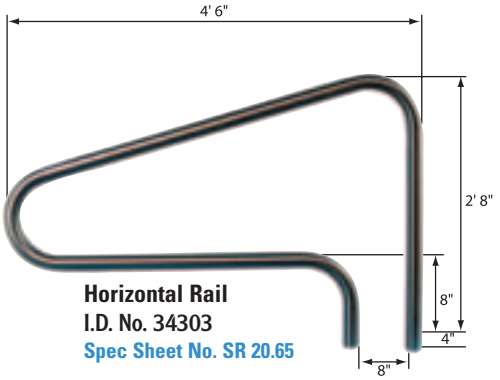
Safety Wedge The protective wedge prevents swimmers from lodging between pool wall and ladder. To ensure maximum effectiveness each wedge is custom fit to each facility. Made from white polypropylene with stainless steel mounting brackets for easy installation or retrofit. I.D. No. 42725 (must be ordered separately)

Deck Mounted Rails

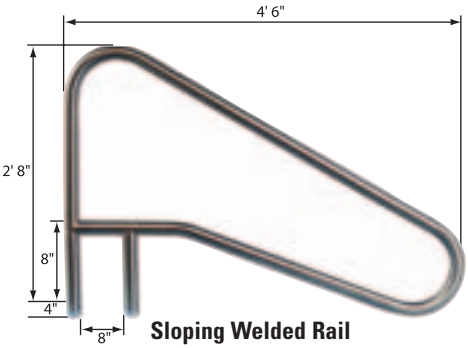
Deck Mounted Rails are intended for use with vinyl or fiberglass pools having premolded steps. Anchorage of the rails to the deck is 8" on center and provides the stability needed without penetrating the molded steps. A variety of models are available to meet any pool or spa configuration. 1.90" O.D. x .065" wall thickness. Heavier gauges available upon request. All rails are 54" long and 32"high. T304 stainless steel polished and buffed to a 320 grit finish. Can be installed directly in concrete or in optional anchor sockets.



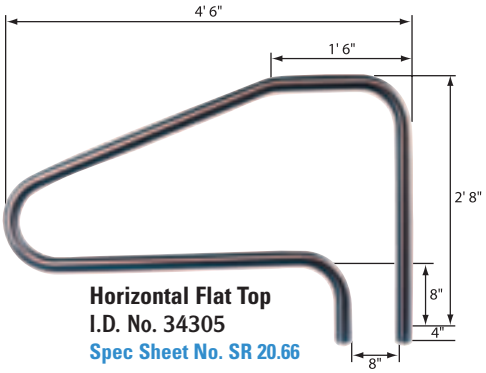
Sloping Rail
I.D. No. 34301
Spec Sheet No. SR 20.63



Horizontal Rail
I.D. No. 34303
Spec Sheet No. SR 20.65



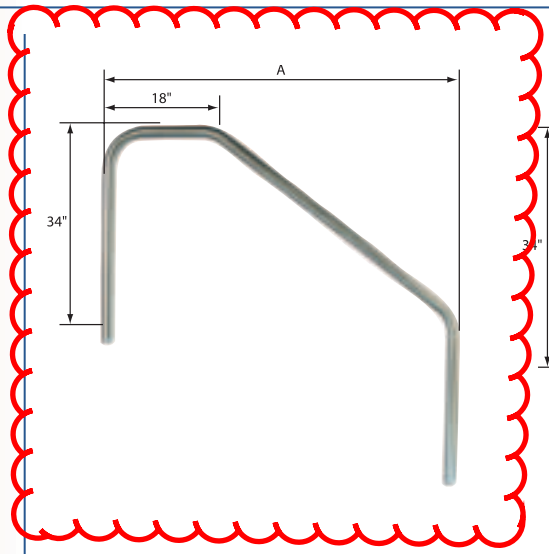
Sloping Welded Rail
I.D. No. 34307
Spec Sheet No. SR 20.64

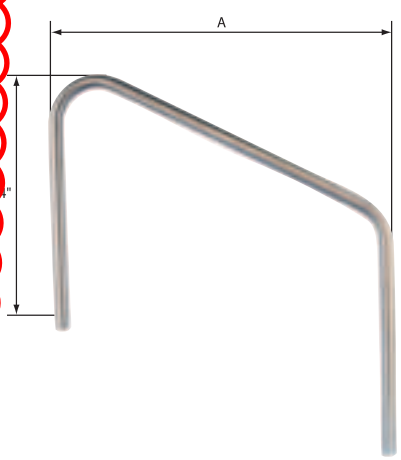


Horizontal Flat Top
I.D. No. 34305
Spec Sheet No. SR 20.66

Stair Mounted Rails

Stair Rails should be used on all pool entry steps as a necessary safety feature to allow safe entry and exit from the pool. T304 stainless steel polished and buffed to a 320 grit finish. Can be installed directly in concrete or in optional anchor sockets.





	48" wide	60" wide	72" wide
2 bend	34101	34102	34103
3 bend	34201	34202	34203

1.90" O.D. x .065" wall thickness.

For 2 Bend Ask for Spec. Sheet No. SR 20.61
For 3 Bend Ask for Spec. Sheet No. SR 20.62

Dixon, Thomas

From: Steve Middaugh [smiddaugh@westernwaterfeatures.com]
Sent: Thursday, May 21, 2009 3:32 PM
To: Dixon, Thomas
Subject: FW: SL - 325 Swim Lift II

Hi Tom,
Here is a copy of the email from Spectrum Products.

Steve Middaugh
Western Water Features

From: Christen Mertes [mailto:clarson@spectrumproducts.com]
Sent: Thursday, May 21, 2009 3:17 PM
To: Steve Middaugh
Subject: SL - 325 Swim Lift II

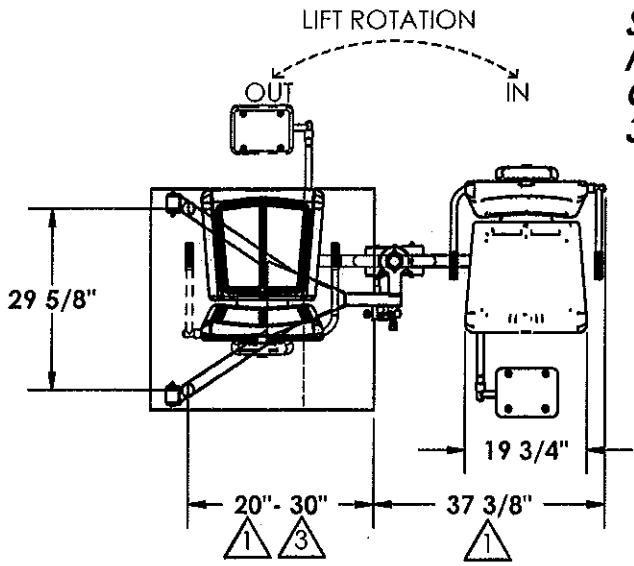
Hi Steve,

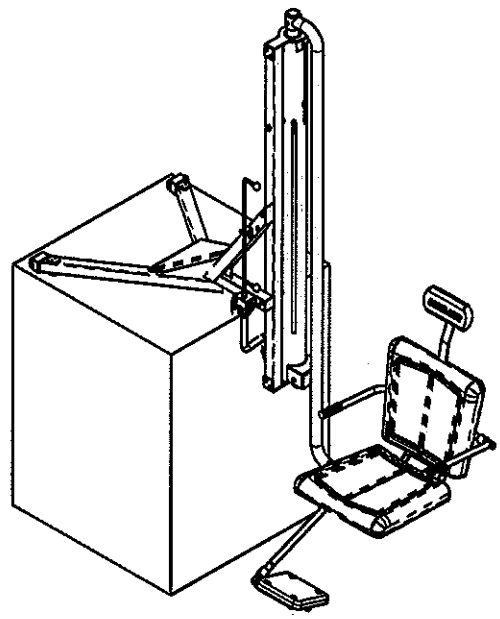
The SL-325 Swim Lift II has been discontinued for almost 7 years now.
We currently have the Gallatin WP400 that would be the equivalent.

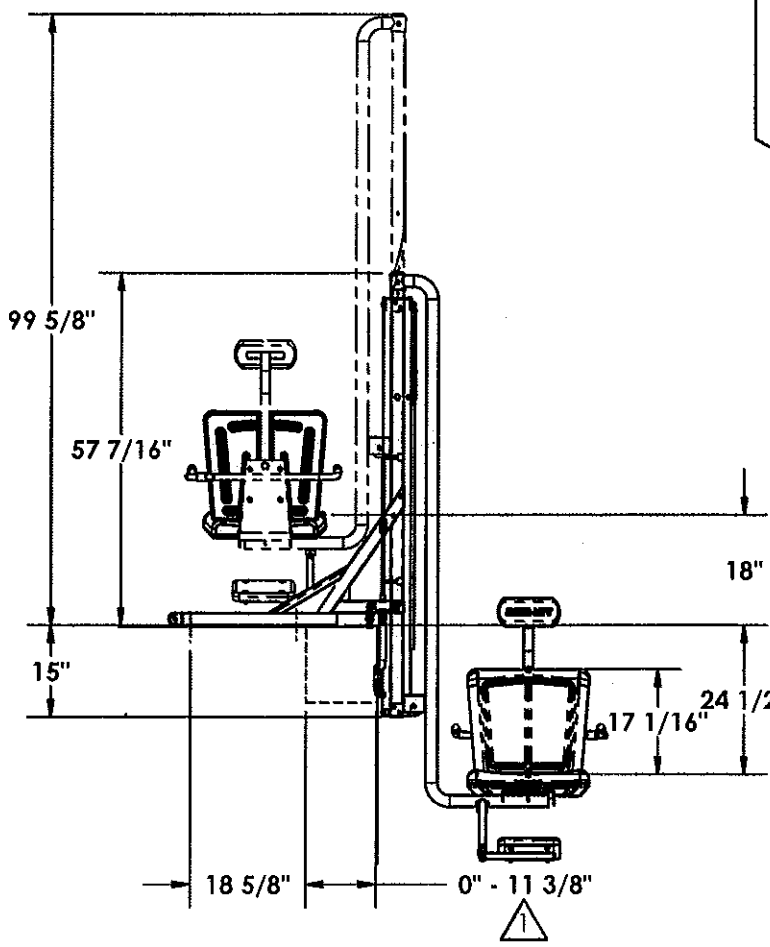
Let me know if you need further information.

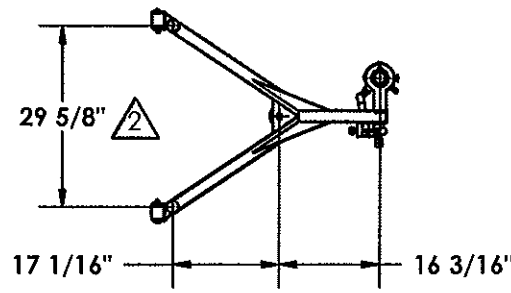
Christen Mertes (Larson)
Spectrum Products
Inside Sales Representative
Direct: 406.532.6349
Fax: 406.542.1158
Web: www.spectrumproducts.com

SWIM LIFT SERIES
MODEL -
GALLATIN WP400 BASE STAND 20" - 30"









2 Note: Clear deck space shall be provided parallel to the water 36" wide x 48" minimum from a line located 2" behind the rear edge of the seat. (15.8.5.3 ADA Guidelines)

3 Note: Preferred setback of 28" from the edge of the pool wall to the anchor locations

1 Dimensions vary with specific applications.

*Note: Specifications are nominal and are subject to change. Please contact Spectrum Products for custom applications.

SPECTRUM Products
7100 Spectrum Lane
Missoula, Montana 59808
406.542.9781 * 800.791.8056
Fax: 406.542.1158
www.spectrumproducts.com

ENGINEERING DATA

PRODUCT:	GALLATIN WP400 BASE STAND 20" - 30"
PRODUCT #:	27336-00
REVISION:	B
MATERIAL:	300 SERIES STAINLESS STEEL

Swim-Lift®, Gallatin WP400, Long Base, 0-6" Water Draft, P/N 27336-00

The Swim-Lift® Gallatin assisted access lift is designed for use with in-ground swimming pools and/or spas having no less than 15" of total water depth (deck to floor of pool). This lift is self-operated and hydraulically powered. The lift is rated at a 400-lb lifting capacity with a pressure of 55-psi. Transport wheels allow the unit to be removed and stored when not in use.

The assisted access lift shall consist of the following components:

Lift
The lifting mechanism is a 4 ½" stainless steel cylinder incorporating a hemispherical shaped piston to facilitate 42" of vertical travel. The base stand, which is to be secured to the deck at two locations 29 5/8" O.C., accommodates anchor locations at 20" to 30" from pool wall.

The lift requires two anchors, and includes two 1" threaded bolts for use in securing the lift to the anchor assembly.

- The preset anchor assembly includes two jig-mounted threaded in-beds that are located 29 5/8" O.C. The preset assembly includes a grounding lug for proper bonding.
- The retrofit anchor assembly includes two threaded in-beds, each with a 3/8" expansion anchor secured at the bottom of the acme nut by a 3/8" bolt.

A valve control handle requiring less than 5-lb of force to operate is to be positioned at both deck and pool levels adjacent to the seat at the resting position to facilitate independent operation. The valve control does not require continuous manual force to operate.

The self-adjusting, swiveling, flip-up footrest measures 10" x 8". The stainless steel flip-up armrest provides stability to the user during lift movement and is structurally capable of supporting the user during transport to or from a wheelchair.

Seat Assembly
The seat is 18" high, 18" deep. The seat surface is flat to ease transfer from a wheelchair. The seat belt assembly employs wide synthetic webbed belts along with a quick release, non-metallic cam-lock buckle.

Water Box
Spectrum recommends a stainless steel water box to be installed in the pool deck adjacent to the installation site of the lift. The box is 8" wide x 8" long x 6 1/8" deep and features a vandal resistant cover. It is provided with a 1 1/8" diameter hole in the side wall to allow for a supply line. A hose spigot should be plumbed into the box allowing for connection of a flexible hose. The removable lid has a 1 1/8" diameter hole for the hose to pass through.

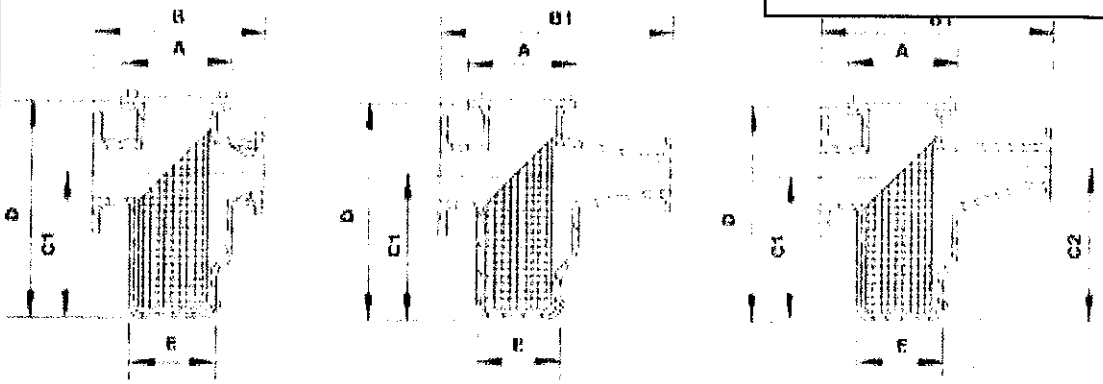
Pressure Amplification System
The pressure amplification system consists of a ½-HP, single-phase, 60-cycle, 3450 RPM stainless steel centrifugal pump. The unit has a performance rating of 5-GPM at 60-psi. The system employs a hydro-pneumatic pressure-sustaining tank having a maximum working pressure of 100-psi with a ¾" NPTM tank as a holding reservoir.

Warranty
Two year limited warranty.

SPECTRUM Products®
7100 Spectrum Lane ~ Missoula, Montana 59808
800.791.8056 ~ 406.542.9781
Fax: 406-542-1158
www.spectrumproducts.com

MERMADE FO SERIES REDUCING STRAINER SIZE & D

Qty. 1 MerMade FO Series 12" x 10" Reducing FRP strainer with acrylic lid and two (2) stainless steel baskets



STANDARD REDUCER CONCENTRIC REDUCER ECCENTRIC REDUCER

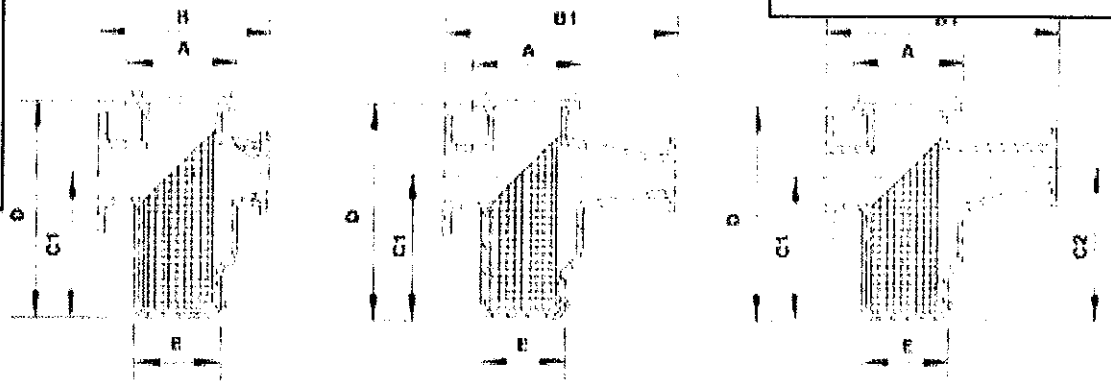
Inlet Diameter	Outlet Diameter	A	B	B1	C1	C2	D	E
4"	3"	9-1/4"	16-5/8"	20-5/8"	12"	12-1/2"	21-1/2"	7-1/4"
4"	2-1/2"	9-1/4"	16-5/8"	20-5/8"	12"	12-3/4"	21-1/2"	7-1/4"
4"	2"	9-1/4"	16-5/8"	20-5/8"	12"	13"	21-1/2"	7-1/4"
6"	5"	11-1/4"	17-5/8"	22-5/8"	15-1/2"	16"	25-1/4"	9-1/4"
6"	4"	11-1/4"	17-5/8"	22-5/8"	15-1/2"	16-1/2"	25-1/4"	9-1/4"
6"	3"	11-1/4"	NA	22-5/8"	15-1/2"	17"	25-1/4"	9-1/4"
6"	2-1/2"	11-1/4"	NA	22-5/8"	15-1/2"	17-1/4"	25-1/4"	9-1/4"
8"	6"	13-1/4"	23-1/2"	31"	17-1/2"	18-1/2"	30-1/4"	11-1/4"
8"	5"	13-1/4"	23-1/2"	31"	17-1/2"	19"	30-1/4"	11-1/4"
8"	4"	13-1/4"	NA	31"	17-1/2"	19-1/2"	30-1/4"	11-1/4"
8"	3"	13-1/4"	NA	31"	17-1/2"	20"	30-1/4"	11-1/4"
10"	8"	15-1/4"	28-3/4"	38-3/4"	21-1/2"	22-1/2"	34-3/4"	13-1/2"
10"	6"	15-1/4"	NA	38-3/4"	21-1/2"	23-1/2"	34-3/4"	13-1/2"
10"	5"	15-1/4"	NA	38-3/4"	21-1/2"	24"	34-3/4"	13-1/2"
10"	4"	15-1/4"	NA	38-3/4"	21-1/2"	24-1/2"	34-3/4"	13-1/2"
12"	10"	17-1/4"	31-1/2"	41-1/2"	23"	24"	37-1/2"	15-3/4"
12"	8"	17-1/4"	NA	41-1/2"	23"	25"	37-1/2"	15-3/4"
12"	6"	17-1/4"	NA	41-1/2"	23"	26"	37-1/2"	15-3/4"
12"	5"	17-1/4"	NA	41-1/2"	23"	26-1/2"	37-1/2"	15-3/4"
14"	12"	23-1/4"	42	52"	31"	32"	48"	21-3/4"
14"	10"	23-1/4"	NA	52"	31"	33"	48"	21-3/4"
14"	8"	23-1/4"	NA	52"	31"	34"	48"	21-3/4"
14"	6"	23-1/4"	NA	52"	31"	35"	48"	21-3/4"
16"	14"	23-1/4"	42	52"	31"	32"	48"	21-3/4"
16"	12"	23-1/4"	NA	52"	31"	33"	48"	21-3/4"
16"	10"	23-1/4"	NA	52"	31"	34"	48"	21-3/4"
16"	8"	23-1/4"	NA	52"	31"	35"	48"	21-3/4"

(BACK TO FRP BASKET STRAINERS)

Knorr Systems, Inc.
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

FO SERIES REDUCING STRAINER SIZE & D

Qty. 1 MerMade FO Series 6" x 4" Reducing FRP strainer with acrylic lid and two (2) stainless steel baskets



STANDARD REDUCER CONCENTRIC REDUCER ECCENTRIC REDUCER

Inlet Diameter	Outlet Diameter	A	B	B1	C1	C2	D	E
4"	3"	9-1/4"	16-5/8"	20-5/8"	12"	12-1/2"	21-1/2"	7-1/4"
4"	2-1/2"	9-1/4"	16-5/8"	20-5/8"	12"	12-3/4"	21-1/2"	7-1/4"
4"	2"	9-1/4"	16-5/8"	20-5/8"	12"	13"	21-1/2"	7-1/4"
6"	5"	11-1/4"	17-5/8"	22-5/8"	15-1/2"	16"	25-1/4"	9-1/4"
6"	4"	11-1/4"	17-5/8"	22-5/8"	15-1/2"	16-1/2"	25-1/4"	9-1/4"
6"	3"	11-1/4"	NA	22-5/8"	15-1/2"	17"	25-1/4"	9-1/4"
6"	2-1/2"	11-1/4"	NA	22-5/8"	15-1/2"	17-1/4"	25-1/4"	9-1/4"
8"	6"	13-1/4"	23-1/2"	31"	17-1/2"	18-1/2"	30-1/4"	11-1/4"
8"	5"	13-1/4"	23-1/2"	31"	17-1/2"	19"	30-1/4"	11-1/4"
8"	4"	13-1/4"	NA	31"	17-1/2"	19-1/2"	30-1/4"	11-1/4"
8"	3"	13-1/4"	NA	31"	17-1/2"	20"	30-1/4"	11-1/4"
10"	8"	15-1/4"	28-3/4"	38-3/4"	21-1/2"	22-1/2"	34-3/4"	13-1/2"
10"	6"	15-1/4"	NA	38-3/4"	21-1/2"	23-1/2"	34-3/4"	13-1/2"
10"	5"	15-1/4"	NA	38-3/4"	21-1/2"	24"	34-3/4"	13-1/2"
10"	4"	15-1/4"	NA	38-3/4"	21-1/2"	24-1/2"	34-3/4"	13-1/2"
12"	10"	17-1/4"	31-1/2"	41-1/2"	23"	24"	37-1/2"	15-3/4"
12"	8"	17-1/4"	NA	41-1/2"	23"	25"	37-1/2"	15-3/4"
12"	6"	17-1/4"	NA	41-1/2"	23"	26"	37-1/2"	15-3/4"
12"	5"	17-1/4"	NA	41-1/2"	23"	26-1/2"	37-1/2"	15-3/4"
14"	12"	23-1/4"	42	52"	31"	32"	48"	21-3/4"
14"	10"	23-1/4"	NA	52"	31"	33"	48"	21-3/4"
14"	8"	23-1/4"	NA	52"	31"	34"	48"	21-3/4"
14"	6"	23-1/4"	NA	52"	31"	35"	48"	21-3/4"
16"	14"	23-1/4"	42	52"	31"	32"	48"	21-3/4"
16"	12"	23-1/4"	NA	52"	31"	33"	48"	21-3/4"
16"	10"	23-1/4"	NA	52"	31"	34"	48"	21-3/4"
16"	8"	23-1/4"	NA	52"	31"	35"	48"	21-3/4"

(BACK TO FRP BASKET STRAINERS)

Knorr Systems, Inc.
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

PACO Pumps
GRUNDFOS CBS
116 Cheryl Ct. **Phone (916) 416-7823**
Folsom, Ca. 95630 **Fax (916) 984-7567**

DATE: 04/01/09

JOB: SAN MATEO POOL

CONT: WWF

I am pleased to submit the following for your review and approval:

COMPETITION POOL **1870 GPM @ 60' TDH**

1 - PACO Model 29N-8015-X type KPVS, bronze fitted, single stage, double suction, vertical mounted, horizontal split case centrifugal pump, complete with mechanical shaft seals, bronze case wear rings, bronze shaft sleeves, stainless steel shaft, and cast iron support stand. The pump is direct connected through an OSHA guarded flexible coupling to a 40 HP, 3 phase, 230/460 volts, 60 hertz, 1150 RPM vertical solid shaft, normal thrust, totally enclosed PREMIUM energy efficient motor. Motor is shipped separate and must be mounted by contractor. Unit is NSF-50 certified and FUSE coated in and out including impeller.

Submittal

PACO PUMPS

KPV 8015-3/4 Material Data Sheet

By:	
Date:	4/1/2009
Rev. #	

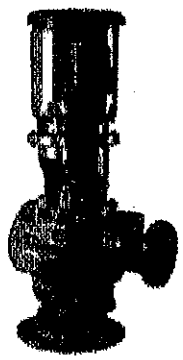
Project:	Tag #	P.O. #
Location:	Model: 8015-3/4	Cust Ref#
Contractor:	Qty:	Agent/Rep:
Engineer:	Service:	Doc #

COMPETITION POOL

TEFC PREMIUM MOTOR

NSF-50 Certified

FUSE COAT IN/OUT incl Impeller.



PACO type KPV split case double suction centrifugal pumps are available in a wide selection of metallurgical and mechanical options to meet specific pumping requirements.

Pump casings are horizontally split at the shaft centerline to simplify inspections and maintenance. Double suction impellers are dynamically and hydraulically balanced and are available in bronze, cast iron, and other special alloys for specific applications.

Shafts are precision ground and cartridge type bearing housings allow a short bearing span for minimum shaft deflection. Oversized heavy duty ball bearings provide long, trouble-free service in continuous operations.

Rotation Options	Clockwise	Impeller Key	Steel, AISI 1045
Base/Stand Type	Cast Iron Stand	Pump Shaft	~~Steel, AISI 1045~~ S.S. 316.
Drip Pan	None	Sleeve Material	Bronze, III932, C89835
Bearing Options	Regreasable	Wear Ring Material	NiAl-Bronze, ASTM-B148, C95500
Connections	126# ANSI	Packing Gland	Not Applicable
Wear Ring Type	Case Wear Ring	Lantern Ring	None
Pump Coatings	Standard Paint	Seal Type	Type 21
NSF-50 Certification	Not Required	O-Rings	Buna N
NSF-61 Certification	Not Required	Seal Flush Options	External Flush, plastic tubing
Motor Drip Canopy	Provided	Gaskets	Veg. Fiber
Casing	Cast Iron, ASTM-A48, CL 30	Casing Bolts	Steel, AISI 1045
Seal/Bearing Housing	Cast Iron, ASTM-A48, CL 30	Comments	
Impeller	Silicon Bronze, ASTM-B584, C87600		

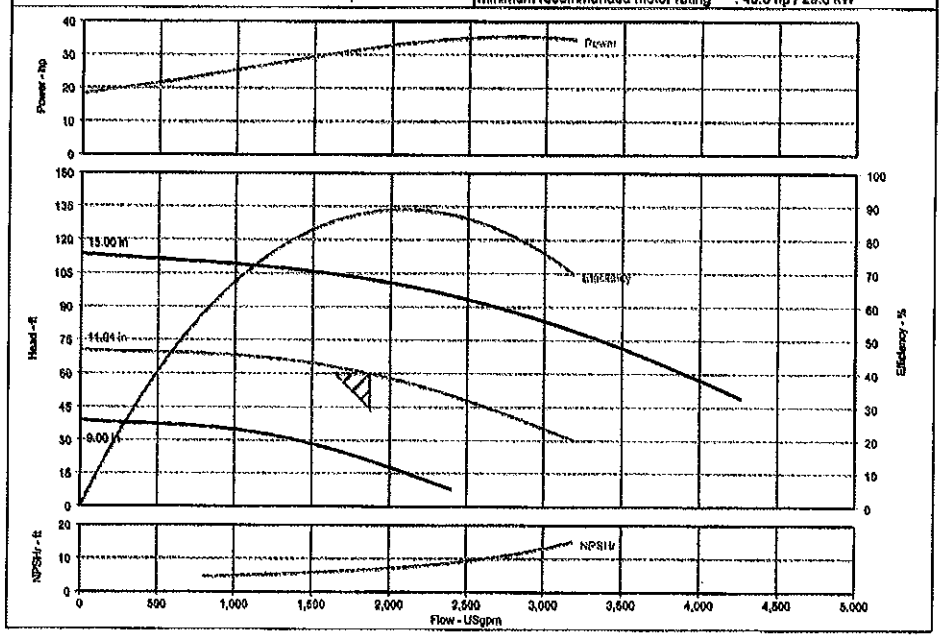
PACO PUMPS

Paco Express 7.0.0.24

Pump Performance Datasheet

Customer	:	Quote number	:
Customer reference	:	Pump size	: 8015-3/4 KP
Item number	:	Stages	: 1
Service	:	Based on curve number	: RC2322-2A Rev 0
Quantity of pumps	: 1	Date last saved	: 01 Apr 2009 12:57 PM

Flow, rated	: 1,870 USgpm	Liquid type	: Water
Head, rated (requested)	: 60.0 ft	Additional liquid description	:
Head, rated (actual)	: 60.0 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Temperature, max	: 68.00 deg F
NPSH available, rated	: Ample	Fluid density, rated / max	: 0.998 / 0.998 SG
Frequency	: 60 Hz	Viscosity, rated	: 1.00 cP
		-	:
Pump speed, rated	: 1,187 rpm		
Impeller diameter, rated	: 11.94 in	Material requested	: Auto
Impeller diameter, maximum	: 15.00 in	Material selected	: Cast Iron
Impeller diameter, minimum	: 9.00 in		
Efficiency	: 66.28 %	Maximum working pressure	: 30.42 psi.g
NPSH required / margin required	: 6.70 / 0.00 ft	Maximum allowable working pressure	: 250.0 psi.g
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,484 / 7,505 US Units	Maximum allowable suction pressure	: 250.0 psi.g
MCSF	: 800 USgpm	Hydrostatic test pressure	: 375.0 psi.g
Head, maximum, rated diameter	: 70.3 ft		
Head rise to shutoff	: 17.17 %	Driver sizing specification	: Rated power
Flow, best eff. point (BEP)	: 2,087 USgpm	Margin over specification	: 0.00 %
Flow ratio (rated / BEP)	: 89.60 %	Service factor	: 1.00
Diameter ratio (rated / max)	: 79.60 %	Power, hydraulic	: 28.3 hp
Head ratio (rated dia / max dia)	: 68.62 %	Power, rated	: 32.0 hp
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00	Power, maximum, rated diameter	: 35.5 hp
Selection status	: Acceptable	Minimum recommended motor rating	: 40.0 hp / 29.8 kW

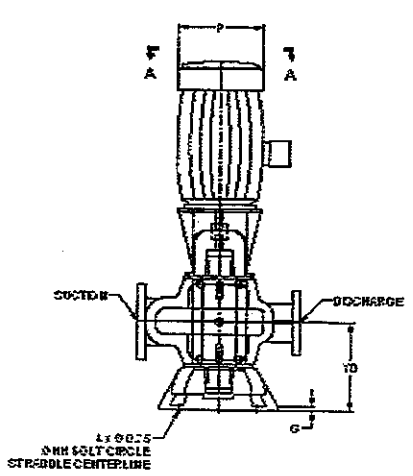


PACO PUMPS

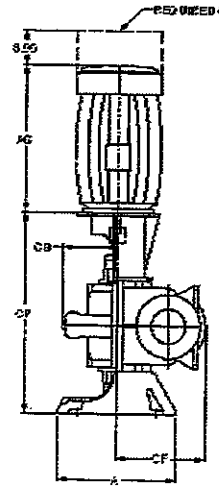
KPV - 8015-3/4 - Dim. Dwg

NOT FOR CONSTRUCTION,
Unless certified and referenced on order.

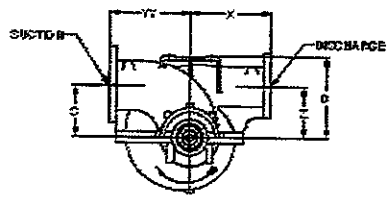
Project:	Model: 8015-3/4	P.O. #	By:
Location:	Rotation: Clockwise	Cust Ref#	Date: 4/1/2009
Contractor:	Qty:	Agent/Rep:	Rev. #
Engineer:	Service:	Tag #	Doc #



SIDE VIEW



END VIEW



VIEW A - A
MOTOR & BRACKET REMOVED

Units	FRAME	SUCT	DISCH	A	AG	CD	CP	D	G	HH	P	S	X	YD	YY	Z	Weight
inches	364HP	10	8	28.00	32.50	12.75	46.75	19.00	0.88	26.00	20.00	12.00	19.00	20.63	19.00	12.00	2320

Conditions of Service		Motor Data			
Flow:	Fluid:	HP: 40	Encl.: TEFC	Phase: Three phase	Eff:
TDH:	Temp:	RPM: 1150	Hz: 60	Voltage: 208-230/460	S.F.: 1.15

SWIM POOL **360 GPM @ 60' TDH**

1- PACO Model 10N-3095-7 (3" x 4") flanged type LC, bronze fitted, close coupled end suction pump, furnished with mechanical shaft seal, bronze case wear ring, STAINLESS steel shaft, bronze sleeve and cast iron case, close coupled to a 7.5 HP, 3 phase, 230/460 volt, 60 hertz, 1750 RPM, totally enclosed PREMIUM energy efficient ball bearing motor. Unit is NSF-50 certified and FUSE coated in and out including impeller.

Cordially,

Tim Hollman
PACO Pumps

Submittal

PACO PUMPS **LC 30957 Material Data Sheet**

By:
Date: 4/1/2009
Rev. #

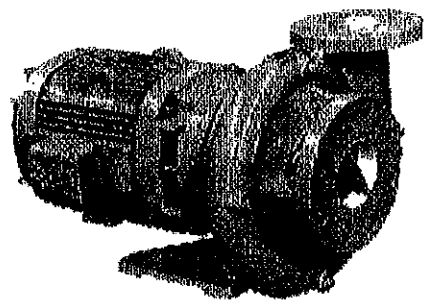
Project:	Tag #	P.O. #
Location:	Model: 30957	Cust Ref#
Contractor:	Qty:	Agent/Rep:
Engineer:	Service:	Doc #

SWIM POOL.

TEFC PREMIUM MOTOR

NSF-50

FUSE COAT IN/OUT INCL SHMP.



PACO type LC, single stage, end suction centrifugal pumps are designed and built for compactness, high performance, durability, and versatility of application.

The PACO close coupled design features a short shaft design for minimum overhang and minimum shaft deflection. All models may be mounted vertically or horizontally, with discharge connections available in several positions.

PACO type LC pumps emphasize standardization of parts and maximum interchangeability permitting the customer a minimum of stock parts and flexibility for future modification. The back pull out feature allows maintenance without disconnecting system piping.

Rotation Options	Clockwise	Impeller Washer	S.S., AISI-303
Base/Stand Type	None	Impeller Key	Steel, AISI 1045
Connections		Sleeve Material	Bronze, III932, C89835
Wear Ring Type	Case Wear Ring	Wear Ring Material	NiAl-Bronze, ASTM-B148, C95500
Pump Coatings	Standard Paint	Packing Gland	Not Applicable
NSF-50 Certification	Not Required	Lantern Ring	None
NSF-61 Certification	Not Required	Seal Type	Type 21
Motor Drip Canopy	Not provided	Seal Material	Ceramic/Carbon/Buna
Casing	Cast Iron, ASTM-A48, CL 30	O-Rings	Buna N
Motor Shaft	~~Stock AISI 1045~~ SS	Seal Flush Options	No External flush
Backplate/Seal Plate	Cast Iron, ASTM A48, CL 30	Gaskets	Veg. Fiber
Motor Bracket	Cast Iron, ASTM-A48, CL 30	Casing Bolts	Steel, AISI 1045
Impeller	Silicon Bronze, ASTM-B584, C87600	Comments	
Impeller Cap Screw	S.S., AISI-303		

PACO PUMP

Paco Express 7.0.0.24

Pump Performance Datasheet

Customer	:	Quote number	:
Customer reference	:	Pump size	: 30857 LC
Item number	:	Stages	: 1
Service	:	Based on curve number	: RC9908-1 Rev 0
Quantity of pumps	: 1	Date last saved	: 01 Apr 2009 12:58 PM

Operating conditions

Flow, rated	: 350 USgpm	Liquid type	: Water
Head, rated (requested)	: 60.0 ft	Additional liquid description	:
Head, rated (actual)	: 60.0 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Temperature, max	: 68.00 deg F
NPSH available, rated	: Ample	Fluid density, rated / max	: 0.998 / 0.998 SG
Frequency	: 60 Hz	Viscosity, rated	: 1.00 cP
		-	:

Impeller

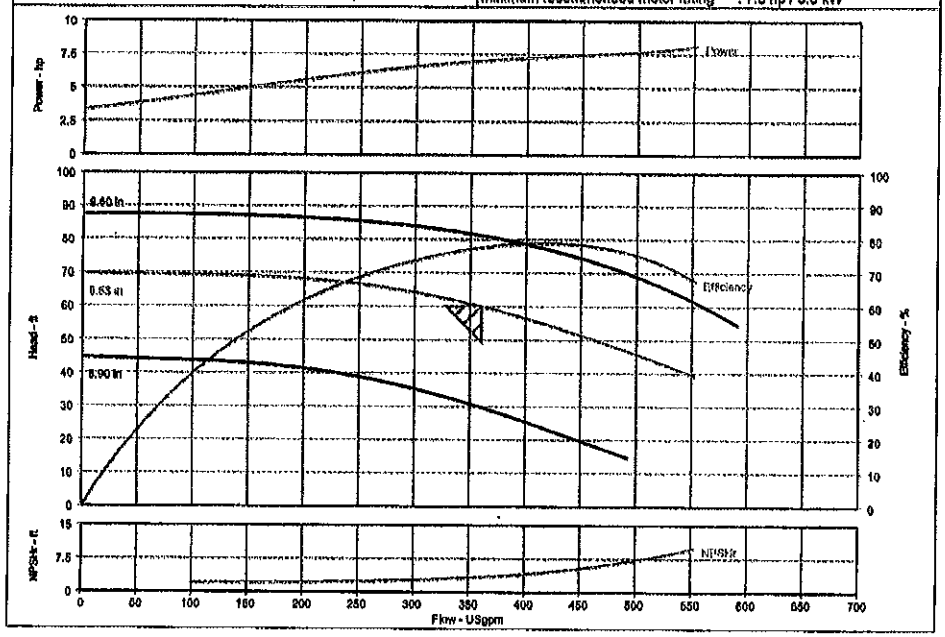
Pump speed, rated	: 1,760 rpm	Material requested	: Auto
Impeller diameter, rated	: 8.53 in	Material selected	: Cast Iron
Impeller diameter, maximum	: 9.00 in		
Impeller diameter, minimum	: 6.00 in		
Efficiency	: 77.58 %		
NPSH required / margin required	: 3.41 / 0.00 ft		
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,552 / 9,630 US Units		
MCSF	: 147 USgpm		
Head, maximum, rated diameter	: 69.6 ft		
Head rise to shutoff	: 16.06 %		
Flow, best eff. point (BEP)	: 416 USgpm		
Flow ratio (rated / BEP)	: 86.45 %		
Diameter ratio (rated / max)	: 86.85 %		
Head ratio (rated dia / max dia)	: 73.82 %		
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00		
Selection status	: Acceptable		

Pressure

Maximum working pressure	: 30.14 psi.g
Maximum allowable working pressure	: 175.0 psi.g
Maximum allowable suction pressure	: 175.0 psi.g
Hydrostatic test pressure	: 263.0 psi.g

Driver

Driver sizing specification	: Rated power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 5.4 hp
Power, rated	: 7.0 hp
Power, maximum, rated diameter	: 8.1 hp
Minimum recommended motor rating	: 7.5 hp / 5.6 kW

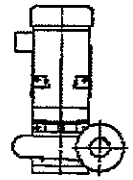


PACO PUMPS

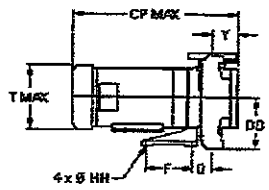
LC - 30957 - Dim. Dwg

NOT FOR CONSTRUCTION,
Unless certified and referenced on order.

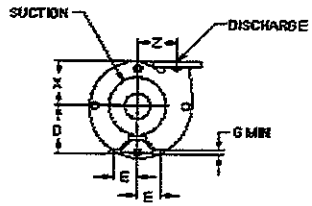
Project:	Model: 30957	P.O. #	By:
Location:	Rotation: Clockwise	Cust Ref#	Date: 4/1/2009
Contractor:	Qty:	Agent/Rep:	Rev. #
Engineer:	Service:	Tag #	Doc #



PLAN



SIDE VIEW



END VIEW

Units	FRAME	SUCT	DISCH	CP	D	DD	E	F	G	HH	Q	T	X	Y	Z	Weight
inches	213JM	4	3	26	7-1/2	8	3-3/4	7-1/2	5/8	7/16	3	9-9/16	7	4	6-1/4	270

Conditions of Service		Motor Data			
Flow:	Fluid:	HP: 7.5	Encl.: TEFC	Phase: Three phase	Eff:
TDH:	Temp:	RPM: 1750	Hz: 60	Voltage: 208-230/460	S.F.: 1.15

Submittal Data

for

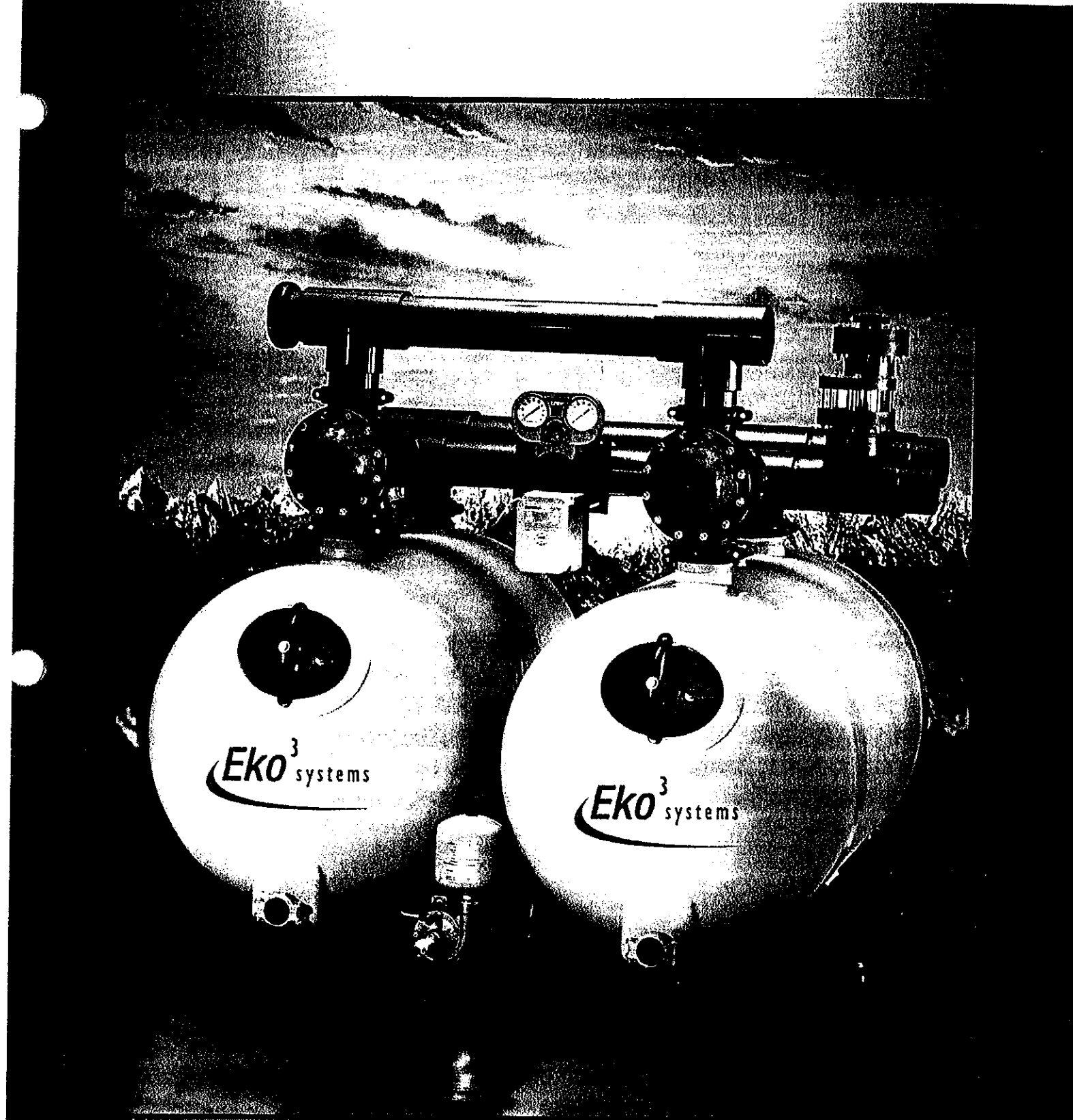
College of San Mateo

Section 131106, 2.8
Competition Pool Filtration System

Eko3 Systems model EKO-42-250-5

Eko3 Systems model EKO-42-250-5 high rate sand filtration system with five (5) 25.0 square foot non-corrosive tanks including all internal components, 12" SCH 80 PVC manifold/face piping kit, backwash valves, backwash sightglass valve, 12" rate of flow valve, 50' of ½" and 15' of 3/8" UV rated tubing, fittings, anchor placement template, mounting hardware, and pressure amplification system. Less filter media. Includes factory start up and operator training.

Knorr Systems, Inc. • 2221 Standard Avenue • Santa Ana, CA 92707
(714) 754-4044 • (714) 754-7791



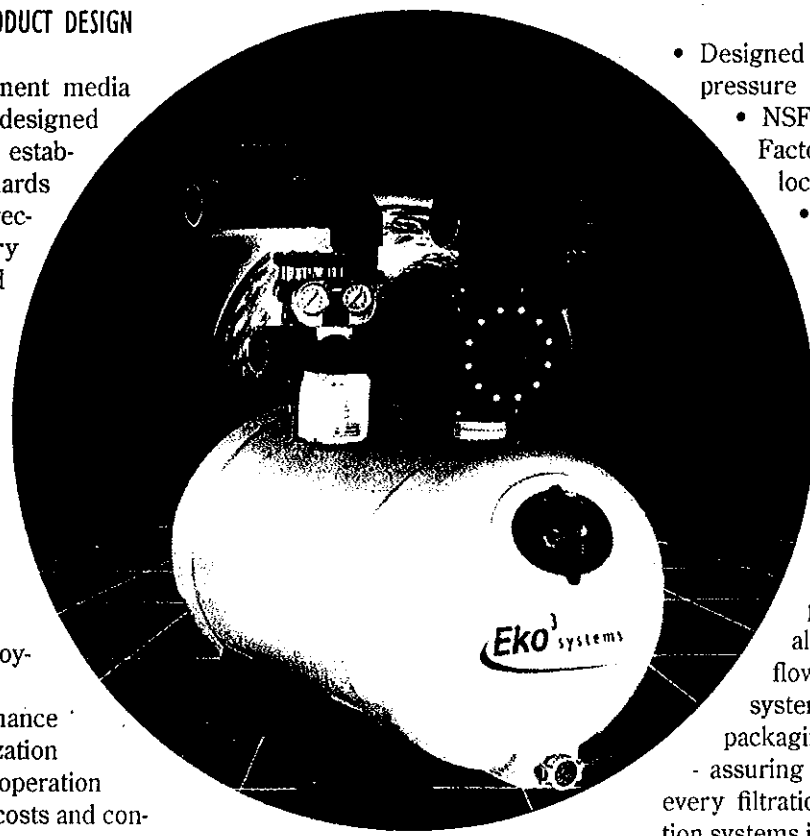
Eko3 systems

Eko3 FILTRATION SYSTEMS

CONSIDERATIONS FOR PRODUCT DESIGN

Eko^3's Hi-Rate permanent media filtration systems are designed with the intention of establishing higher standards for the commercial recreational water industry - standards associated with water treatment equipment efficiency, water quality, product quality and ease of installation and operation. Design considerations provide for:

- Pure and safe water production - safeguarding the health of patrons and employees
- Guaranteed performance and systems optimization through automated operation
- Reduced operating costs and conservation of natural resources
- System performance documentation
- Protection against systems malfunction through the use of an alert system
- Maintenance minimization and extended equipment life
- Easy and affordable installation in both new and retrofit applications
- Return on investment planning support



PRODUCT FEATURES

We are pleased to bring you systems that will meet your needs for decades to come. Eko^3's filtration systems exceed all of the product design criteria previously established. Many system features are unique to our product offerings and, therefore, are not found in competitive products. Features of the Hi-Rate permanent media filtration systems include:

- Automated filter and water chemistry control systems
- Water quality control monitoring and data logging
- Provisions for remote operation
- Onboard energy management system
- Backwash using clean filtered water
- Chemical and water level monitoring and alert system
- Fail-safe features to safeguard all operations
- Component accessibility
- Smaller footprint, modular design
- Non-corroding components - built to last
- Designed for 100 psi working pressure
- NSF Standard 50 Listed
- Factory-trained and certified local technicians
- 15 Year Warranty

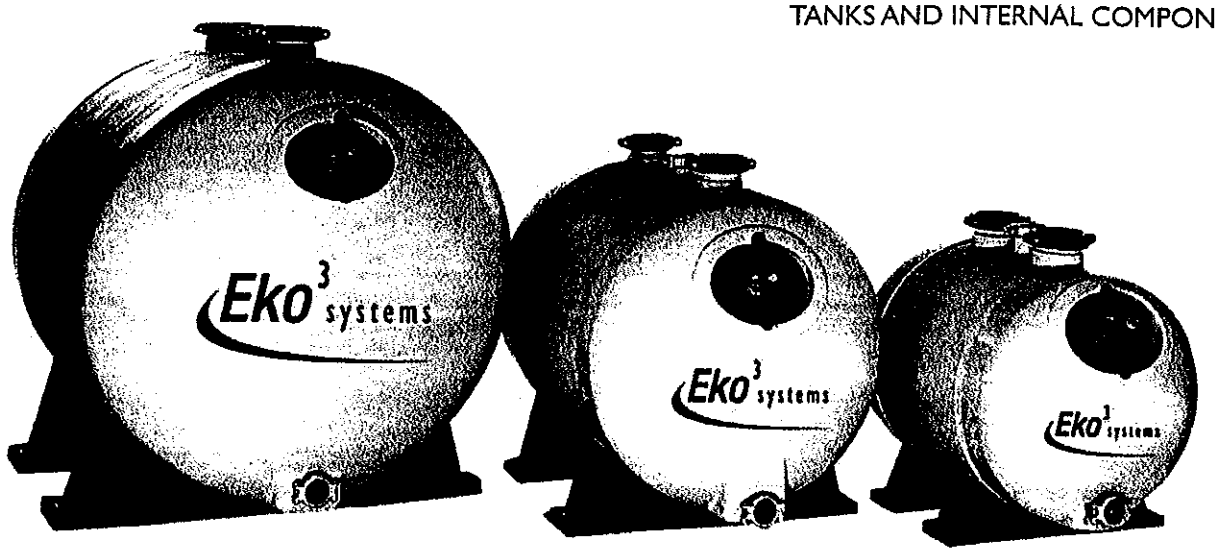
STRICT FABRICATION REQUIREMENTS

Assembly line productions allow us to offer pre-engineered filtration systems that have consistent quality at affordable prices. Investment in the appropriate tools and fixtures allows us to pressure test, flow test and operate all system components prior to packaging them for shipment - assuring owner satisfaction with every filtration system. Eko^3 Filtration systems include:

- Tank(s)
- Face piping
- Backwash and system operational control valves
- Gauge panels
- Your choice of operating systems

THE BENEFITS

- Reduces manpower requirements
- Safer water enviornment for patrons
- Requires less floor space and ceiling height
- Provides for system payback
- Requires less energy to operate
- Single control center for logging facility operating history
- Allows for onsite or offsite system control and monitoring
- All componenets are made of non-corroding materials
- Ease of installation and operation



60" Inside Diameter Tank - 30 sq ft - 35 sq ft - 40 sq ft - 45 sq ft - 50 sq ft - 60 sq ft of filter area
42" Inside Diameter Tank - 20 sq ft - 22.5 sq ft - 25 sq ft - 27.5 sq ft - 31 sq ft - 36 sq ft - 41 sq ft - 46 sq ft of filter area
34" Inside Diameter Tank - 10 sq ft - 12.6 sq ft - 15.3 sq ft - 19.3 sq ft - 23.7 sq ft of filter area

FILTER TANKS

Eko3 provides a superior filtration system for use in the recreational water industry. Cutting edge technology has been employed to provide an efficient and functional system with the highest degree of structural integrity. The unit's high-pressure filter tank, available in three inside diameters 34, 42 and 60 inch, allow for flexibility of the end-user's needs. There is no internal liner or bladder to rupture or cause leaking, no metals, no coating to crack and fail, and no bulkhead fittings to crack and leak. Our filter tanks are designed to be completely integral, using fiberglass, Kevlar and resin construction.

Features of our high-pressure vessels are:

- Made entirely of non-corroding materials:
  - Polyurethane resin
  - Fiberglass strands and roving
  - Kevlar
  - Non-corroding tank support saddles
- 100 psi working pressure with 4:1 safety factor
- Integrally cast fiberglass tank port connections
- 12" x 16" clear acrylic manhole - view window
- Automatic and manual air relief systems
- 3" media evacuation port with winterizing drain port
- Accommodates Seismic structure requirements
- ANSI/NSF Standard 50 Listed

Semi-spherical overhead diverters

Commercial/Industrial duty underdrain laterals

INTERNAL COMPONENTS OF THE FILTER TANK

All internal components are made of industrial grade non-corroding material, Schedule 80 PVC, polypropylene, ABS and stainless steel.

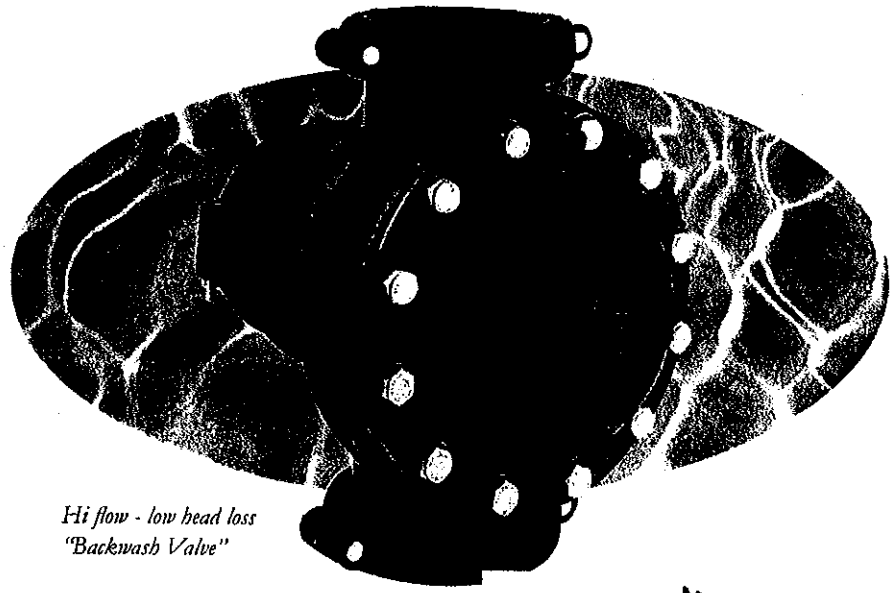
- Horizontal filters:
  - First ever flow regulationg (underdrain) system
  - Flow-performance engineered
  - Hydraulically balanced
  - Metered flow
- Material selection allowing for commercial and industrial application
  - 2 1/2" Structurally superior lateral underdrains
  - 1 1/4" NPT lateral to header connection
  - Overhead diverters that maintain Reynolds numbers below 2500
  - Schedule 80 PVC manifold headers

AIR RELIEF SYSTEMS

- Internal and external air relief systems
- Manual external system features non-corroding valve
- Automatic reachable/cleanable anti-fouling filter screen

FILTER MEDIA

- #20 and #30 Silica Sand
- NSF listed for us with both grades of sand



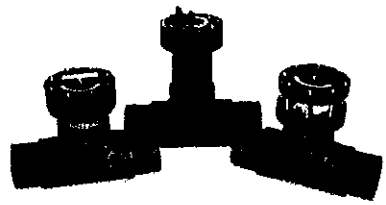
Hi flow - low head loss "Backwash Valve"

BACKWASH VALVE

Eko^3's two-way, three-port, 6" lps backwash valve features extra large waterways.

Design Features and Benefits:

- ABS construction
  Reduced head loss through valve
- No external moving parts
- No valve adjustment needed
- Backwash using clean filtered water on multiple tank systems
- Automatic or manual operation
- Water pressure actuated
- 100 psi system operating pressure
- Pump to continue to run during operating cycles
- Made of non-corroding materials
- No maintenance required
- Grooved valve connections allowing for ease of installation



FILTER SYSTEM CONTROLLING VALVES

A backwash sightglass valve assembly and a flow rate valve or a priority valve is provided with each filter system.

Valve Function and Benefits:

Backwash Sightglass Valve

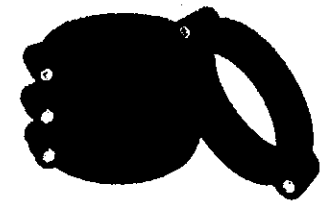
- Controls backwash flow rate
- Allows for visual reference to backwash water through large (4-inch) clear viewing pipe
- Tamper-proof, gate-type valve

Flow Rate Control Valve

- Controls flow rate of single and multiple tank systems
- Allows for flow consistency
  Tamper-proof, gate-type valve

Priority Valve

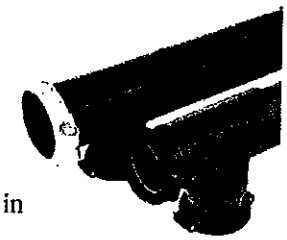
- Controls flow rate for two tank filter systems
- Allows for flow consistentency
- Ensures proper backwash flow rate
- Tamper-proof, gate-type valve



GROOVED COUPLINGS

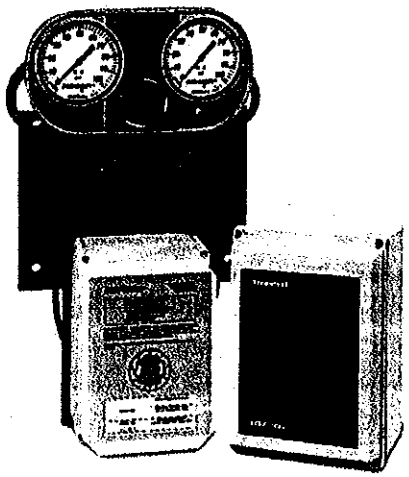
Grooved couplings allow for slight misalignments and uneven mechanical room floors. Six-inch grooved couplings are injection molded ABS. Eight-inch through twelve-inch couplings are galvanized Ductile Iron.

FACE PIPING



We have designed our face piping to be the highest quality, most installer-friendly in the industry.

- Located on top of filter
  - Minimizes floor space requirements
  - Complete access to filter components
  - All Schedule 80 PVC
  - Standard 6" waste piping
  - Large models utilize 8" to 12" piping
  - Complete access to filter components
- Modular design
  - Quick and easy to install
  - Simple future expansion
- Fittings are extruded from the piping istself in manifolds 8" and above
  - No solvent welded seams
  - No more leaky fittings
  - Eiliminates dimensional stack-up problems



ECONOMICAL AUTOMATIC FILTER CONTROL

All Eko^3 filtration systems are supplied with a filter "Control Console" center that is attached to the filter system. Control of all filter system functions are initiated through this control center whether they are manual or automatic driven. The console center features:

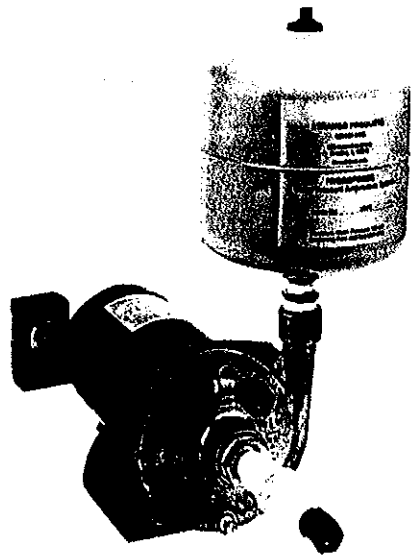
- Gauge panel with two, four-inch 0 to 100 psi pressure gauges and provisions to house a pressure differential switch gauge
- Injection-molded ABS sequencing valve
- Indication dial for sequencing valve operation
- Provisions for sequencing valve motor driven - automatic operation
- NEMA 4X sequencing valve assembly enclosure

MANUAL CONTROL

Manual operation is accomplished through simple manipulation of a sequencing valve dial located on the filter system "Control Console".

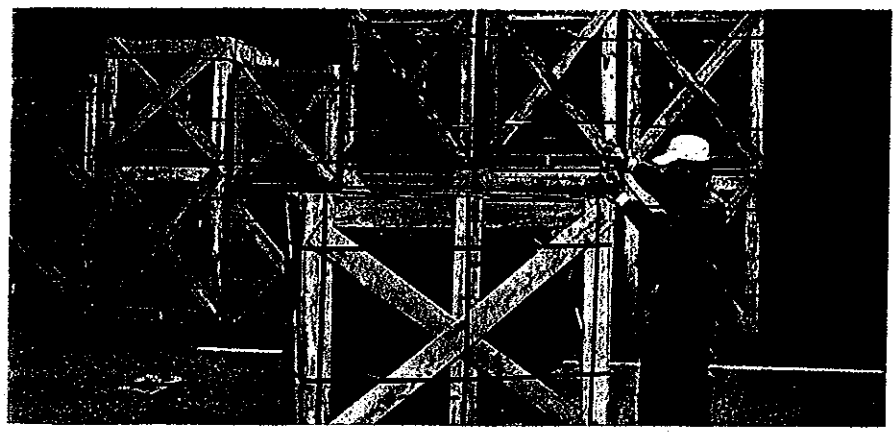
PRESSURE AMPLIFICATION SYSTEM

Eko^3's unique pressure sustaining system is supplied to provide constant, sustained pressure to actuate filter control valves. We use only clean, filtered water in the actuation process - assuring failsafe operation. Naturally for long life performance, the pump is stainless steel with a glass-filled Noryl impeller.



PACKAGING

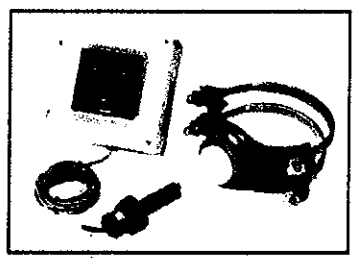
All Eko^3 filtration systems are properly packaged to prevent damage during shipment and storage. All filter tanks are skidded, and wrapped in a thick layer of plastic to protect the tank finish during installation. Our attention to proper packing ensures that our quality filtration system will be delivered to you undamaged.



SERVICE AND SUPPORT

As with all Eko^3 equipment and systems, factory-trained and certified local providers are available for system start-up and service. Factory start-up consists of site-specific, system calibration and personnel training.

Our factory-trained service technicians are an organization of certified commercial recreational water sales and service providers. They are dedicated to providing solutions for recreational water facilities by utilizing state-of-the-art technologies and ongoing client education and support. The cumulative experience of serving thousands of commercial recreational water facilities gives our technicians a bank of ideas and experience unrivaled in the industry.



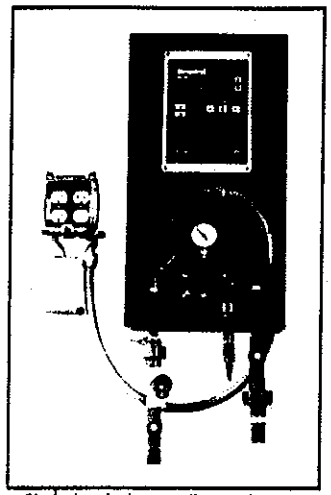
Eko^3 Signet flow monitor kits

CERTIFICATIONS

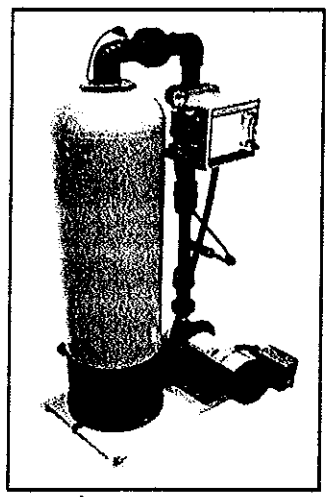
Eko^3 filters are listed by the National Sanitation Foundation (ANSI/NSF Standard 50) under Nemato Corporation, who makes these filters to Eko^3's unique specifications. Certified/stamped engineers drawings and calculations are available upon request, supporting working pressures and seismic loading.

WARRANTY

A 15 year no-nonsense warranty applies to Eko^3 filtration systems. The first year is unconditional. The second through fifteenth year are limited and prorated.



Eko^3 chemical controller enclosures and wiring components



Eko^3 pH-MTS carbon dioxide feed system

Eko^3 Filtration Systems are manufactured to Eko^3's unique specifications by Nemato Corporation and are available through trained and authorized regional service-supported equipment distributors.

REPRESENTED BY:

LASER PRINT FULL SIZE (NOT SCALED TO FIT) USING INSIDE CORNERS OF GREEN LINES AS A PLOT WINDOW. ORIGIN : X=0.14 , Y=0.00

NOTES:

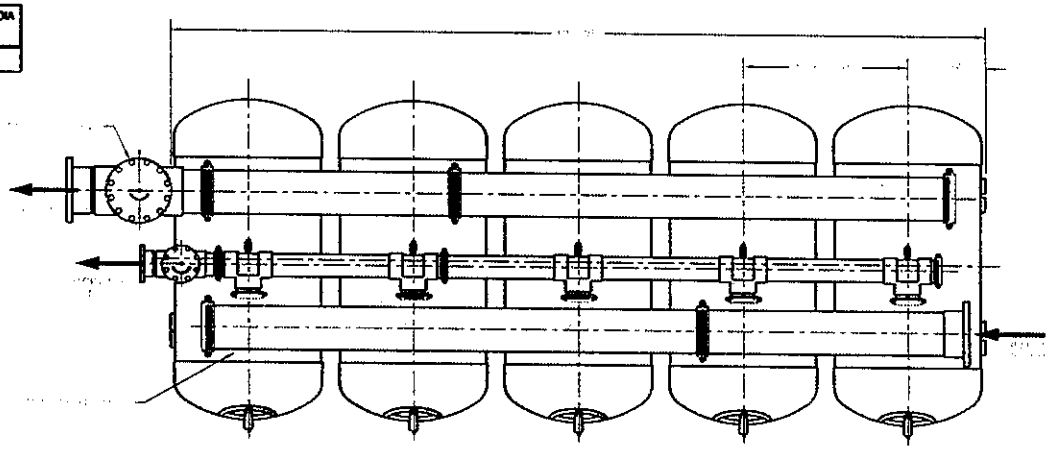
- FILTER FACE PIPING MAY BE ASSEMBLED TO THE TANKS TO ALLOW FOR LEFT OR RIGHT ACCESS FOR PLUMBING CONNECTIONS.
- ALL PIPE SUPPORTS BY OTHERS.
- ADEQUATE PIPE SUPPORT FOR ANY PIPING SYSTEM IS A MATTER OF GREAT IMPORTANCE.
- THE CHART BELOW ILLUSTRATES THE MAXIMUM SUPPORT SPACING AS A GUIDE ONLY.
- PIPE SUPPORTS MUST BE INSTALLED AS PER PVC PIPE MANUFACTURER'S PROCESS PIPING DESIGN GUIDES.

RECOMMENDED MAXIMUM SUPPORT SPACING

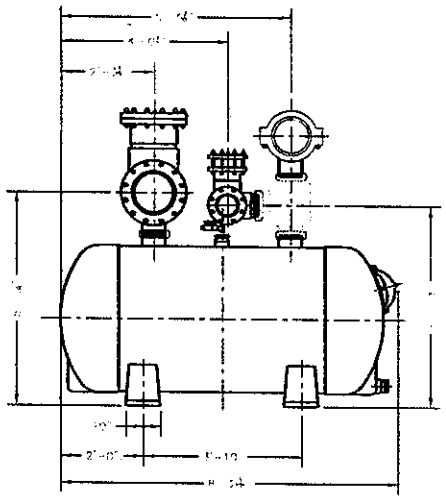
TEMP.	SCHEDULE 80 NOMINAL PIPE SIZE				
	4"	6"	8"	10"	12"
60°F	10.25 ft	12.75 ft	14.75 ft	17 ft	19 ft
100°F	9 ft	11.25 ft	13.25 ft	15 ft	16.75 ft
140°F	7.75 ft	9.75 ft	11.33 ft	13 ft	14.33 ft

FILTER MODEL	No. OF TANKS	FILTER AREA (sq ft)	FILTER FLOW (gpm) @ FLOW RATE OF:		
			10	15	20
EKO-42-250-5	5	125	1250	1875	2500

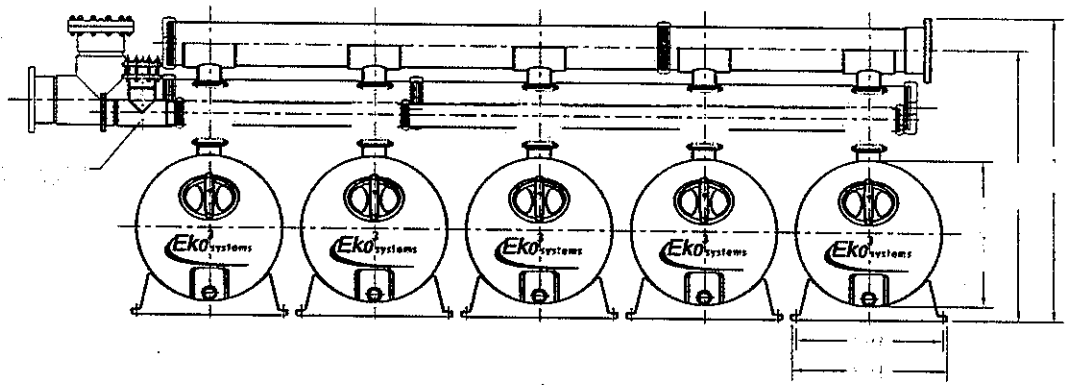
OPERATING WEIGHT (lbs)	BACKWASH FLOW RATE (gpm)		FILTER MEDIA (cu ft)
	MINIMUM	MAXIMUM	
32000	375	500	200



PLAN



SIDE ELEVATION



END ELEVATION

No	DATE	REVISION	BY

APPROVED:
CHECKED:
DWG. REF.:
DRAWN: SPB
SCALE: N.T.S.
DATE: OCT. 17, 2005
S.O.:
P.O.:

Eko systems

NEMATO CORP.
1605 McEwen Drive, Whitby, Ontario, Canada
Tel: (905) 571-5305 Fax: (905) 571-5935

EKO-42-250-5,100 PSI,HIGHRATE SAND FILTERS
FIVE TANK, 12" INFLUENT AND EFFLUENT

DRAWING NO. EKO-42-250-5 REV. 00

SHEET 1 OF 86

Submittal Data

for

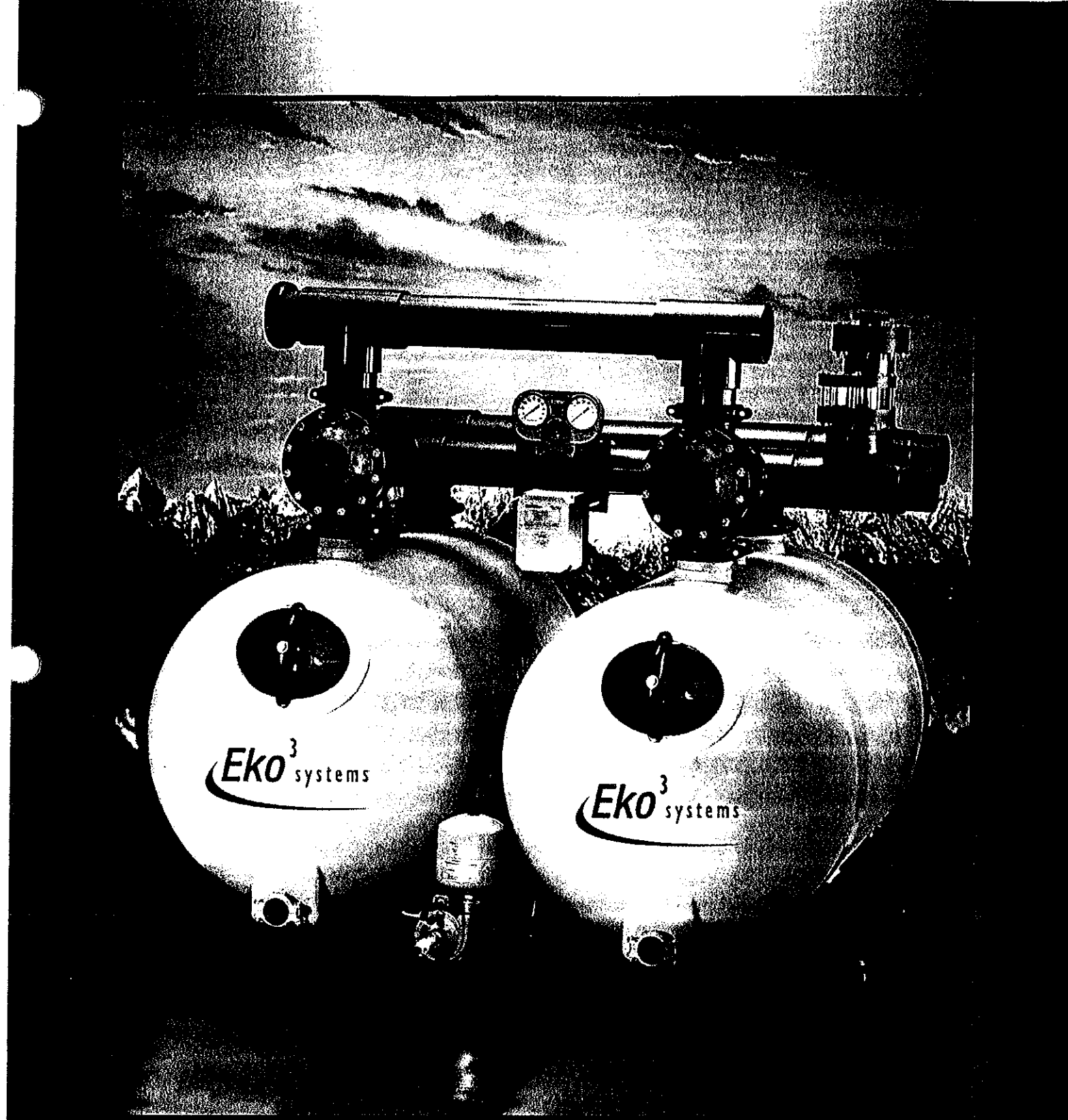
College of San Mateo

Section 131106, 2.9
Swimming Pool Filtration System

Eko3 Systems model EKO-42-310-1

Eko3 Systems model EKO-42-310-1 high rate sand filtration system with one (1) 31.0 square foot non-corrosive tank including all internal components, 6" SCH 80 PVC manifold/face piping kit, backwash valves, backwash sightglass valve, 6" rate of flow valve, 50' of ½" and 15' of 3/8" UV rated tubing, fittings, anchor placement template, mounting hardware, and pressure amplification system. Less filter media. Includes factory start up and operator training.

Knorr Systems, Inc. • 2221 Standard Avenue • Santa Ana, CA 92707
(714) 754-4044 • (714) 754-7791



Eko3 systems

Eko3 FILTRATION SYSTEMS

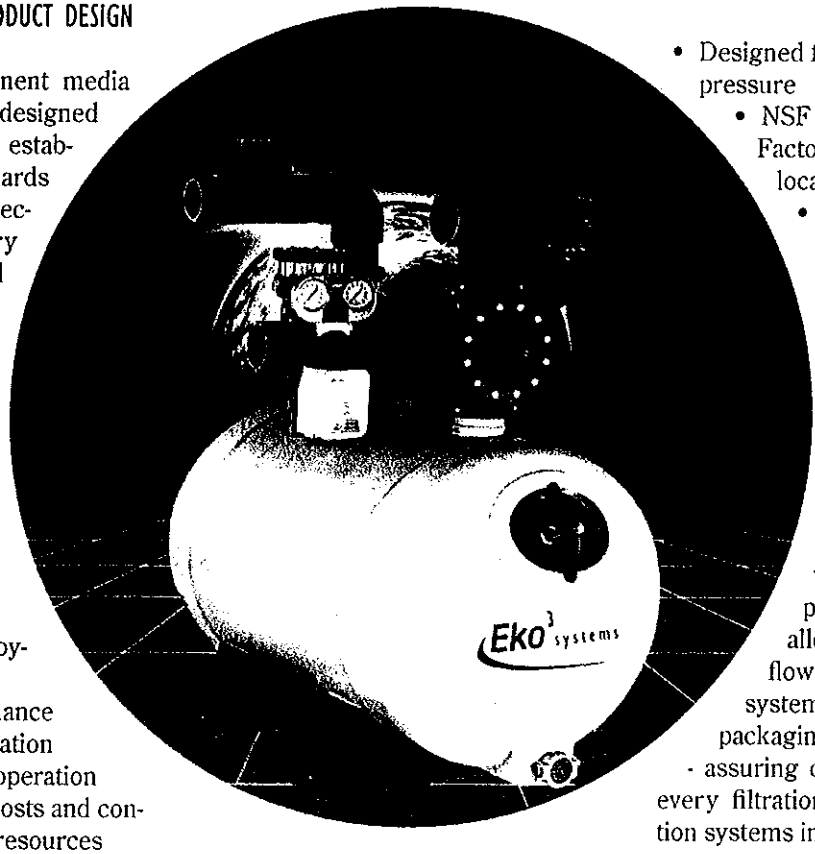
CONSIDERATIONS FOR PRODUCT DESIGN

Eko³'s Hi-Rate permanent media filtration systems are designed with the intention of establishing higher standards for the commercial recreational water industry - standards associated with water treatment equipment efficiency, water quality, product quality and ease of installation and operation. Design considerations provide for:

- Pure and safe water production - safeguarding the health of patrons and employees
- Guaranteed performance and systems optimization through automated operation
- Reduced operating costs and conservation of natural resources
- System performance documentation
- Protection against systems malfunction through the use of an alert system
- Maintenance minimization and extended equipment life
- Easy and affordable installation in both new and retrofit applications
- Return on investment planning support

PRODUCT FEATURES

We are pleased to bring you systems that will meet your needs for decades to come. Eko³'s filtration systems exceed all of the product design criteria previously established. Many system features are unique to our product offerings and, therefore, are not found in competitive products. Features of the Hi-Rate permanent media filtration systems include:



- Automated filter and water chemistry control systems
- Water quality control monitoring and data logging
- Provisions for remote operation
- Onboard energy management system
- Backwash using clean filtered water
- Chemical and water level monitoring and alert system
- Fail-safe features to safeguard all operations
- Component accessibility
- Smaller footprint, modular design
- Non-corroding components - built to last
- Designed for 100 psi working pressure
- NSF Standard 50 Listed
- Factory-trained and certified local technicians
- 15 Year Warranty

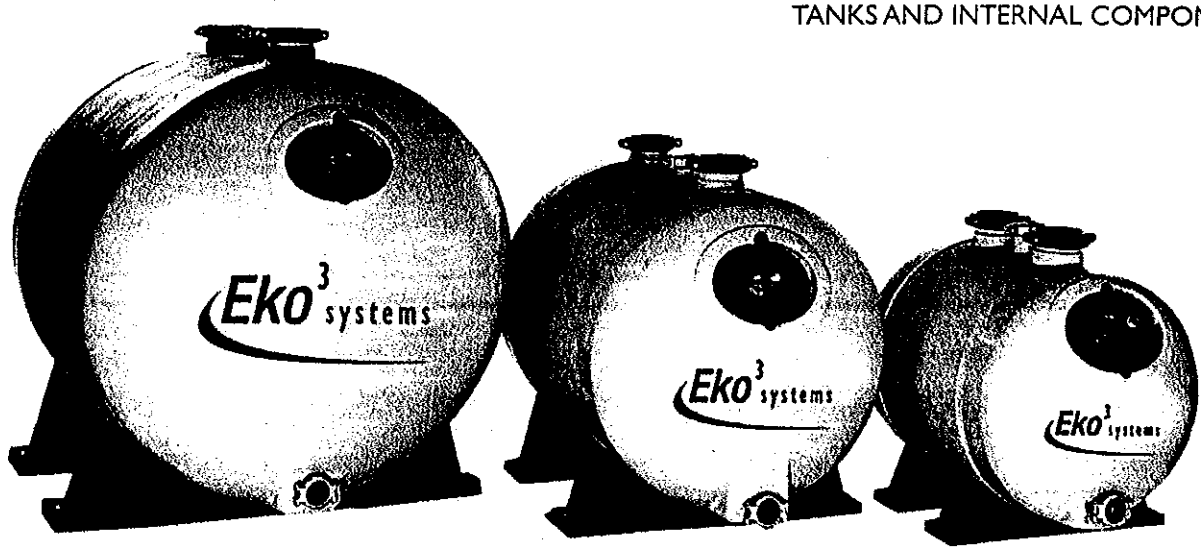
STRICT FABRICATION REQUIREMENTS

Assembly line productions allow us to offer pre-engineered filtration systems that have consistent quality at affordable prices. Investment in the appropriate tools and fixtures allows us to pressure test, flow test and operate all system components prior to packaging them for shipment - assuring owner satisfaction with every filtration system. Eko³ Filtration systems include:

- Tank(s)
- Face piping
- Backwash and system operational control valves
- Gauge panels
- Your choice of operating systems

THE BENEFITS

- Reduces manpower requirements
- Safer water enviornment for patrons
- Requires less floor space and ceiling height
- Provides for system payback
- Requires less energy to operate
- Single control center for logging facility operating history
- Allows for onsite or offsite system control and monitoring
- All componenets are made of non-corroding materials
- Ease of installation and operation



60" Inside Diameter Tank - 30 sq ft - 35 sq ft - 40 sq ft - 45 sq ft - 50 sq ft - 60 sq ft of filter area
42" Inside Diameter Tank - 20 sq ft - 22.5 sq ft - 25 sq ft - 27.5 sq ft - 31 sq ft - 36 sq ft - 41 sq ft - 46 sq ft of filter area
34" Inside Diameter Tank - 10 sq ft - 12.6 sq ft - 15.3 sq ft - 19.3 sq ft - 23.7 sq ft of filter area

FILTER TANKS

Eko^3 provides a superior filtration system for use in the recreational water industry. Cutting edge technology has been employed to provide an efficient and functional system with the highest degree of structural integrity. The unit's high-pressure filter tank, available in three inside diameters 34, 42 and 60 inch, allow for flexibility of the end-user's needs. There is no internal liner or bladder to rupture or cause leaking, no metals, no coating to crack and fail, and no bulkhead fittings to crack and leak. Our filter tanks are designed to be completely integral, using fiberglass, Kevlar and resin construction.

Features of our high-pressure vessels are:

- Made entirely of non-corroding materials:
  - Polyurethane resin
  - Fiberglass strands and roving
  - Kevlar
  - Non-corroding tank support saddles
- 100 psi working pressure with 4:1 safety factor
- Integrally cast fiberglass tank port connections
- 12" x 16" clear acrylic manhole - view window
- Automatic and manual air relief systems
- 3" media evacuation port with winterizing drain port
- Accommodates Seismic structure requirements
- ANSI/NSF Standard 50 Listed

Semi-spherical overhead diverters

Commercial/Industrial duty underdrain laterals

INTERNAL COMPONENTS OF THE FILTER TANK

All internal components are made of industrial grade non-corroding material, Schedule 80 PVC, polypropylene, ABS and stainless steel.

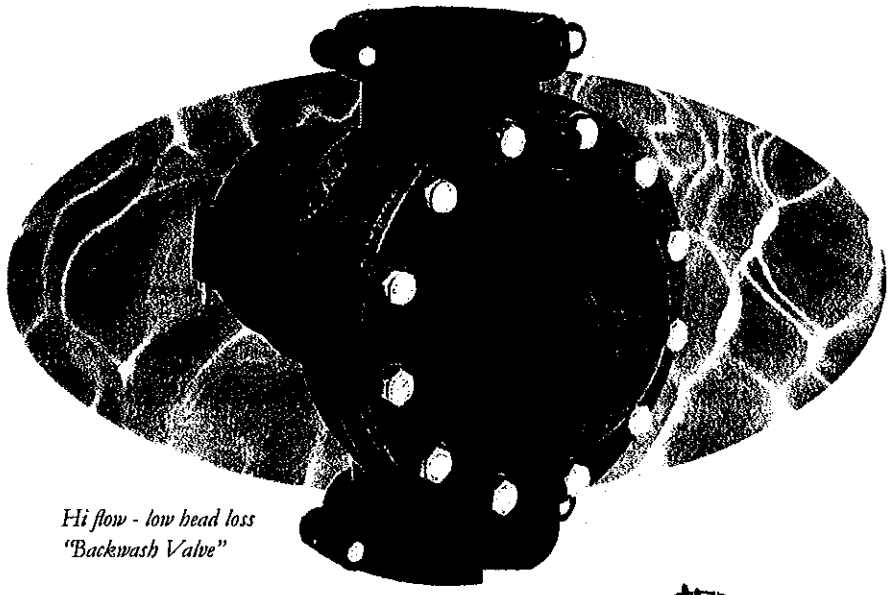
- Horizontal filters:
  - First ever flow regulationg (underdrain) system
  - Flow-performance engineered
  - Hydraulically balanced
  - Metered flow
- Material selection allowing for commercial and industrial application
  - 2 1/2" Structurally superior lateral underdrains
  - 1 1/4" NPT lateral to header connection
  - Overhead diverters that maintain Reynolds numbers below 2500
  - Schedule 80 PVC manifold headers

AIR RELIEF SYSTEMS

- Internal and external air relief systems
- Manual external system features non-corroding valve
- Automatic reachable/cleanable anti-fouling filter screen

FILTER MEDIA

- #20 and #30 Silica Sand
- NSF listed for us with both grades of sand



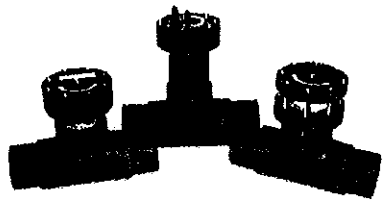
Hi flow - low head loss "Backwash Valve"

BACKWASH VALVE

Eko^3's two-way, three-port, 6" lps backwash valve features extra large waterways.

Design Features and Benefits:

- ABS construction
  Reduced head loss through valve
- No external moving parts
- No valve adjustment needed
- Backwash using clean filtered water on multiple tank systems
- Automatic or manual operation
- Water pressure actuated
- 100 psi system operating pressure
- Pump to continue to run during operating cycles
- Made of non-corroding materials
- No maintenance required
- Grooved valve connections allowing for ease of installation



FILTER SYSTEM CONTROLLING VALVES

A backwash sightglass valve assembly and a flow rate valve or a priority valve is provided with each filter system.

Valve Function and Benefits:

Backwash Sightglass Valve

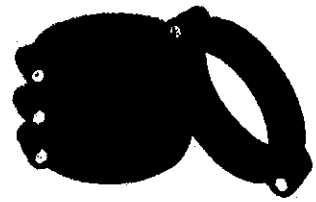
- Controls backwash flow rate
- Allows for visual reference to backwash water through large (4-inch) clear viewing pipe
- Tamper-proof, gate-type valve

Flow Rate Control Valve

- Controls flow rate of single and multiple tank systems
- Allows for flow consistency
  Tamper-proof, gate-type valve

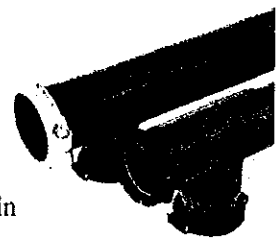
Priority Valve

- Controls flow rate for two tank filter systems
- Allows for flow consistentency
- Ensures proper backwash flow rate
- Tamper-proof, gate-type valve



GROOVED COUPLINGS

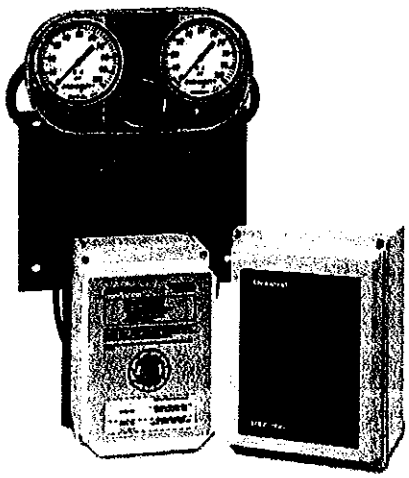
Grooved couplings allow for slight misalignments and uneven mechanical room floors. Six-inch grooved couplings are injection molded ABS. Eight-inch through twelve-inch couplings are galvanized Ductile Iron.



FACE PIPING

We have designed our face piping to be the highest quality, most installer-friendly in the industry.

- Located on top of filter
  - Minimizes floor space requirements
  - Complete access to filter components
  - All Schedule 80 PVC
  - Standard 6" waste piping
  - Large models utilize 8" to 12" piping
  - Complete access to filter components
- Modular design
  - Quick and easy to install
  - Simple future expansion
- Fittings are extruded from the piping istself in manifolds 8" and above
  - No solvent welded seams
  - No more leaky fittings
  - Eiliminates dimensional stack-up problems



ECONOMICAL AUTOMATIC FILTER CONTROL

All Eko^3 filtration systems are supplied with a filter "Control Console" center that is attached to the filter system. Control of all filter system functions are initiated through this control center whether they are manual or automatic driven. The console center features:

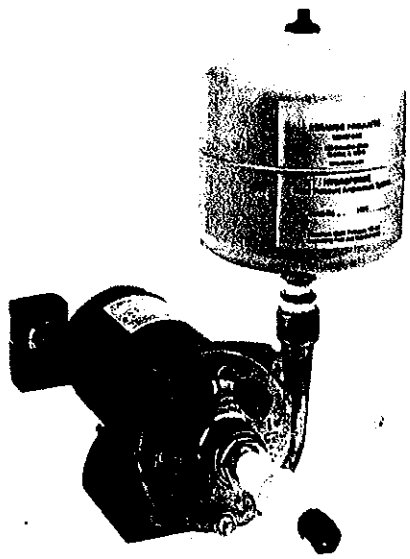
- Gauge panel with two, four-inch 0 to 100 psi pressure gauges and provisions to house a pressure differential switch gauge
- Injection-molded ABS sequencing valve
- Indication dial for sequencing valve operation
- Provisions for sequencing valve motor driven - automatic operation
- NEMA 4X sequencing valve assembly enclosure

MANUAL CONTROL

Manual operation is accomplished through simple manipulation of a sequencing valve dial located on the filter system "Control Console".

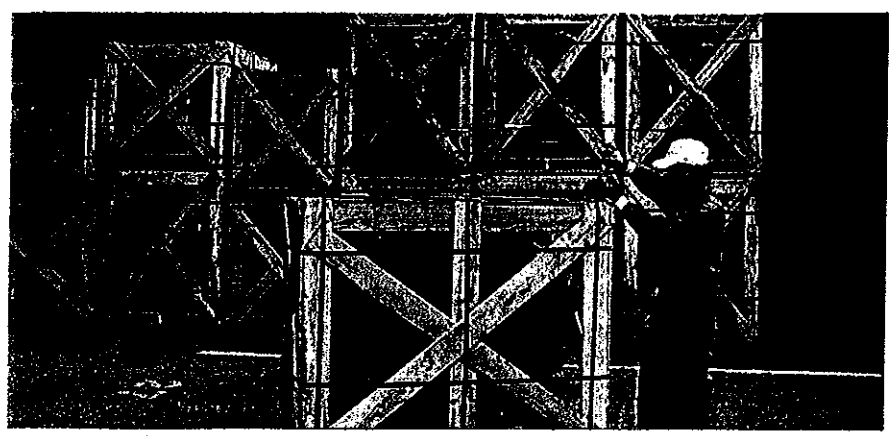
PRESSURE AMPLIFICATION SYSTEM

Eko^3's unique pressure sustaining system is supplied to provide constant, sustained pressure to actuate filter control valves. We use only clean, filtered water in the actuation process - assuring failsafe operation. Naturally for long life performance, the pump is stainless steel with a glass-filled Noryl impeller.



PACKAGING

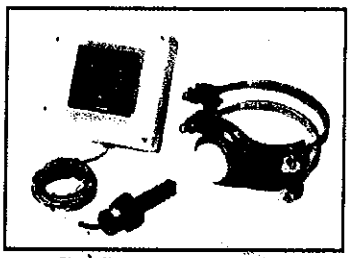
All Eko^3 filtration systems are properly packaged to prevent damage during shipment and storage. All filter tanks are skidded, and wrapped in a thick layer of plastic to protect the tank finish during installation. Our attention to proper packing ensures that our quality filtration system will be delivered to you undamaged.



SERVICE AND SUPPORT

As with all Eko^3 equipment and systems, factory-trained and certified local providers are available for system start-up and service. Factory start-up consists of site-specific, system calibration and personnel training.

Our factory-trained service technicians are an organization of certified commercial recreational water sales and service providers. They are dedicated to providing solutions for recreational water facilities by utilizing state-of-the-art technologies and ongoing client education and support. The cumulative experience of serving thousands of commercial recreational water facilities gives our technicians a bank of ideas and experience unrivaled in the industry.



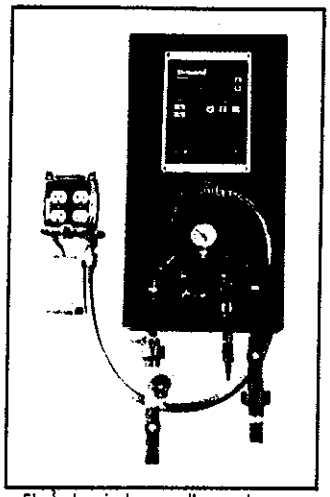
Eko^3 Signet flow monitor kits

CERTIFICATIONS

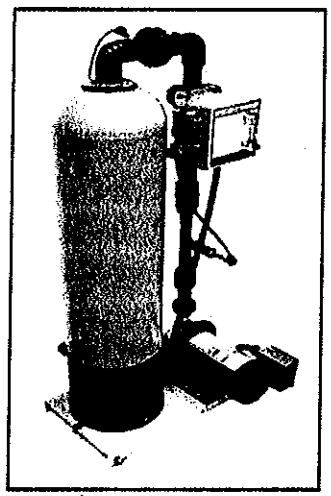
Eko^3 filters are listed by the National Sanitation Foundation (ANSI/NSF Standard 50) under Nemato Corporation, who makes these filters to Eko^3's unique specifications. Certified/stamped engineers drawings and calculations are available upon request, supporting working pressures and seismic loading.

WARRANTY

A 15 year no-nonsense warranty applies to Eko^3 filtration systems. The first year is unconditional. The second through fifteenth year are limited and prorated.



Eko^3 chemical controller enclosures and wiring components



Eko^3 pH-MTS carbon dioxide feed system

Eko^3 Filtration Systems are manufactured to Eko^3's unique specifications by Nemato Corporation and are available through trained and authorized regional service-supported equipment distributors.

REPRESENTED BY:

LASER PRINT FULL SIZE (NOT SCALED TO FIT) USING INSIDE CORNERS OF GREEN LINES AS A PLOT WINDOW. ORIGIN : X=0.14 , Y=0.00

NOTES:

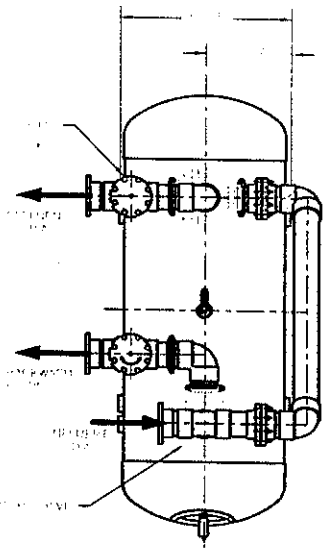
- FILTER FACE PIPING MAY BE ASSEMBLED TO THE TANKS TO ALLOW FOR LEFT OR RIGHT ACCESS FOR PLUMBING CONNECTIONS.
- ALL PIPE SUPPORTS BY OTHERS.
- ADEQUATE PIPE SUPPORT FOR ANY PIPING SYSTEM IS A MATTER OF GREAT IMPORTANCE.
- THE CHART BELOW ILLUSTRATES THE MAXIMUM SUPPORT SPACING AS A GUIDE ONLY.
- PIPE SUPPORTS MUST BE INSTALLED AS PER PVC PIPE MANUFACTURER'S PROCESS PIPING DESIGN GUIDES.

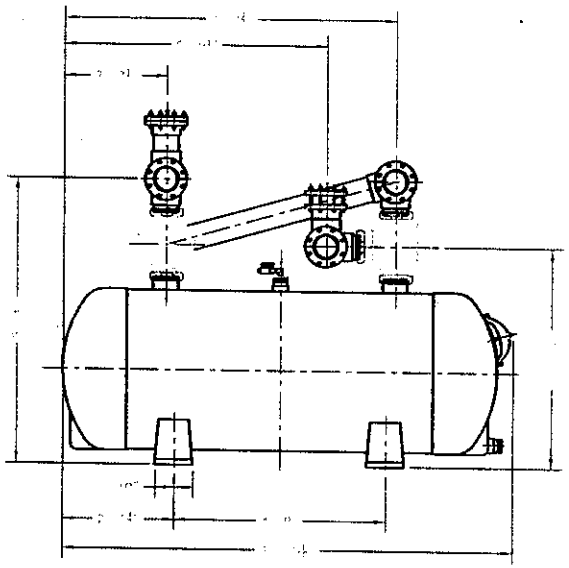
RECOMMENDED MAXIMUM SUPPORT SPACING

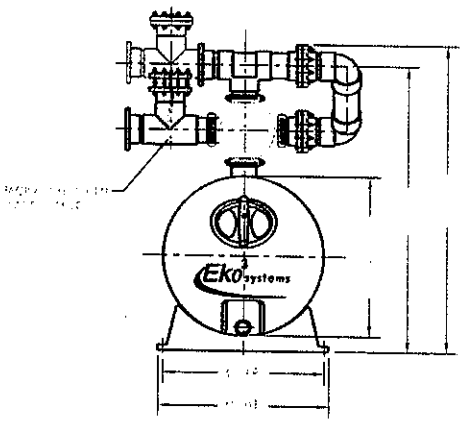
TEMP.	SCHEDULE 80 NOMINAL PIPE SIZE				
	4"	6"	8"	10"	12"
60°F	10.25 ft	12.75 ft	14.75 ft	17 ft	19 ft
100°F	9 ft	11.25 ft	13.25 ft	15 ft	16.75 ft
140°F	7.75 ft	9.75 ft	11.33 ft	13 ft	14.33 ft

FILTER MODEL	No. OF TANKS	FILTER AREA (sq ft)	FILTER FLOW (gpm) @ FLOW RATE OF:		
			10	15	20
EKO-42-310-1	1	31	310	465	620

OPERATING WEIGHT (lbs)	BACKWASH FLOW RATE (gpm)		FILTER MEDIA (cu ft)
	MINIMUM	MAXIMUM	
8040	465	620	49







No	DATE	REVISION	BY

APPROVED:
CHECKED:
DWG. REF.:
DRAWN: SPB
SCALE: N.T.S.
DATE: OCT. 17, 2005
S.O.:
P.O.:

Eko3 systems

NEMATO CORP.
1605 McEwen Drive, Whitby, Ontario, Canada
Tel: (905) 571-5305 Fax: (905) 571-3933

EKO-42-310-1,100 PSI,HIGHRATE SAND FILTERS
SINGLE TANK, 6" INFLUENT AND EFFLUENT

DRAWING NO. EKO-42-310-1 REV. 00

SHEET 1 OF 1

Submittal Data

for

College of San Mateo

Section 131106, 2.10
Competition Pool & Swimming Pool
Water Chemistry and Filter
Backwash Controllers

Strantrol model CS-Impact-Filter-APR

Strantrol model CS-Impact-Filter-APR water chemistry and filter backwash controller with high resolution HRR and pH sensors, flowcell assembly, safety flowswitch, temperature sensor, Signet flowsensor (12" for Competition Pool; 6" for Swimming Pool) and iron saddle, communication modem and software mounted in lockable enclosure with auto probe rinse package and AC surge and phone modem line suppressors. Includes factory start up and operator training.

Knorr Systems, Inc. • 2221 Standard Avenue • Santa Ana, CA 92707
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Water Technologies

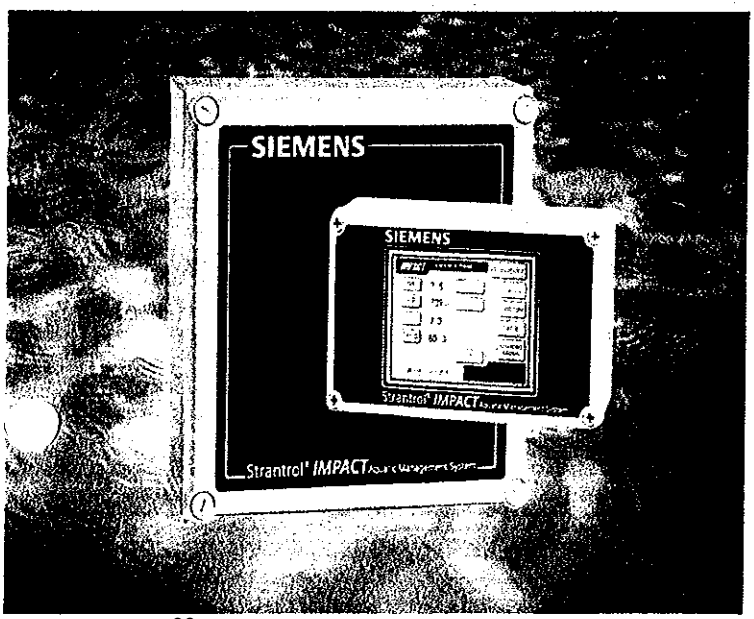
Strantrol® Impact Filter / Chemical Aquatic Management System

Product Sheet

SIEMENS

The Strantrol® Impact Aquatic Management System controller is the beginning of a new generation of mechanical / chemical pool and spa controllers from Siemens Water Technologies. The Strantrol® Impact Filter / Chemical (F/C) controller is designed to provide the operator with easy menu navigation, detailed help screens and a remote touch screen for custom accessibility. The modularity of the Strantrol® Impact controller allows for more upgrade options.

The Strantrol® Impact controller has the ability to control the chemical and filter functions for a body of water. The controller features include demand-based chlorine feed utilizing patented Enhanced Time-Based Proportioning and automated fecal recovery. High Resolution Redox® sensors will control the body of water at a higher ppm level in the event of a fecal accident.



Remote Display with Impact Chemical Controller

Benefits of the Strantrol® Impact Controller Include:

- Modular Platform with Expansion Capabilities
- Remote Operating Panel with Touch Screen Control
- Simultaneous HRR®/ppm Pool Control
- Backwash Safety Devices and Chemical Feed Tube Protection
- Automated Fecal Recovery
- Patented Enhanced Time-Based Proportioning with Graphical Data Logging
- Proprietary Flowswitch for Ultimate Protection in No-Flow Conditions

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INPUTS

Sensors

pH (temperature compensated), HRR®, Temperature, Flow Switch, Backwash Sump Level Switch, Differential Pressure Switch, ppm*, Flow Sensor*, Surge Tank Switch*, pH Level*, Cl_2 Level*, pH Feed Tube Pressure* or Cl_2 Feed Tube Pressure*, Turbidimeter*

Display Ranges

pH Sensor	2-12 0.1 resolution
HRR® Sensor	0-1000mV 1mV resolution
Temperature Sensor	32-150° F 1° F resolution 0-65° C 1° C resolution
ppm*	0-20 0.1 ppm resolution
Flow Rate*	0-9,000,000 Gallons 1,000 Gallons resolution 0-1,800 m^3/h 1 m^3/h resolution
pH Level*	0-100 ft, 0-1,000 lbs 0.1 ft, 0.1 lbs resolution 0-30 m, 0-450 kg 0.1 m, 0.1 kg resolution
Cl_2 Level*	0-100 ft, 0-1,000 lbs 0.1 ft, 0.1 lbs resolution 0-30 m, 0-450 kg 0.1 m, 0.1 kg resolution
pH Feed Tube Pressure*	0-200 psi 0.1 psi resolution 0-13.7 bar 0.1 bar resolution
Cl_2 Feed Tube Pressure*	0-200 psi 0.1 psi resolution 0-13.7 bar 0.1 bar resolution
Turbidity*	0-9.99 NTU 0.1 NTU Resolution

*Optional

OUPUTS (Filter / Chemical Pool Control)

Relays (5A @ 115 VAC) - 4 or 8 solid state relays
pH sensing control
HRR® sensing control with ppm backup
Heater Control
Alarm
No Flow Alarm
Auxiliary (booster pump)
Sensor Wash*
Surge Tank Autofill*
Recirculation Protect control*
Automated Fecal Recovery*
8 additional solid state relays (5A@115 VAC)*
Cl_2 Booster
Filter Backwash
Recirculation Pump
Pressure Amplifier Pump
Polymer Feed*

DATA LOGGING

The data logging frequency is selectable from 1 to 60 minutes

COMMUNICATIONS

Direct	9600-57,600 bps; RJ11 offset connection jack
Modem*	33,600 bps data rate; RJ11 connection jack
Network Port*	RS485 @ 19,200 bps
MODBUS Upgrade	Upload site specific parameters to make setup less time consuming

SECURITY PASSWORDS

Operator (6)
Managers (2)
Representative (1)

PHYSICAL SPECIFICATIONS

Dimensions	(H x W x D)
Controller	15.7" x 15.7" x 6.7" 399 x 399 x 170 mm
Remote Display Box	5.5" x 9.1" x 3.7" 139.7 x 231 x 94 mm
Touch Screen	4.75" x 3.5" 120.7 mm x 88.9 mm

Materials

Enclosures	Light grey PC/PBT blended plastic with a UL® Standard 94–5VA flammability rating

Meets UL® Standard 508, NEMA 4X and IEC529—I.P 66

Non-metallic closing screws, modified polyurethane door gasket, non-metallic wall mount brackets

Flowcell Body	PVC
Flowcell Cover	Clear, Acrylic
Sensor	Polysulfone 28 mL inorganic electrolyte

Surge / Balancing Tank Switch*
Corrosion Resistant Epoxy

Chemical Level Indicators*
PVC schedule 40
NEMA 4X enclosure

Pressure Transducers
316 SS Body, Chemical Resistant Diaphragm

Backwash Sump Level Switch
Corrosion Resistant Epoxy

Flow Meter & Saddle*
Polypropylene, Titanium
Cast Iron

Turbidimeter*
Corrosive Resistant Coated enclosure
PVC wetted parts

PROGRAMMABLE ALARMS

pH, HRR®, Temp, ppm*
No Flow – Disables feed relay outputs
Chemical Overfeed – Disables feed pumps
Flow Restored Delay
LSI / Ryznar
pH Level*
Cl_2 Level*
Flow Rate*
pH Feed Tube Pressure*
Cl_2 Feed Tube Pressure*
Page Out Alarm—Modem*
E-mail Out Alarm—Network Port*

Siemens

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714-754-4044

Literature No. ST-IMPACT FC-DS-0906
Subject to change without notice.

Submittal Data

for

College of San Mateo

Section 131106, 2.11A
Competition Pool Heaters

Lochinvar model CPN2071

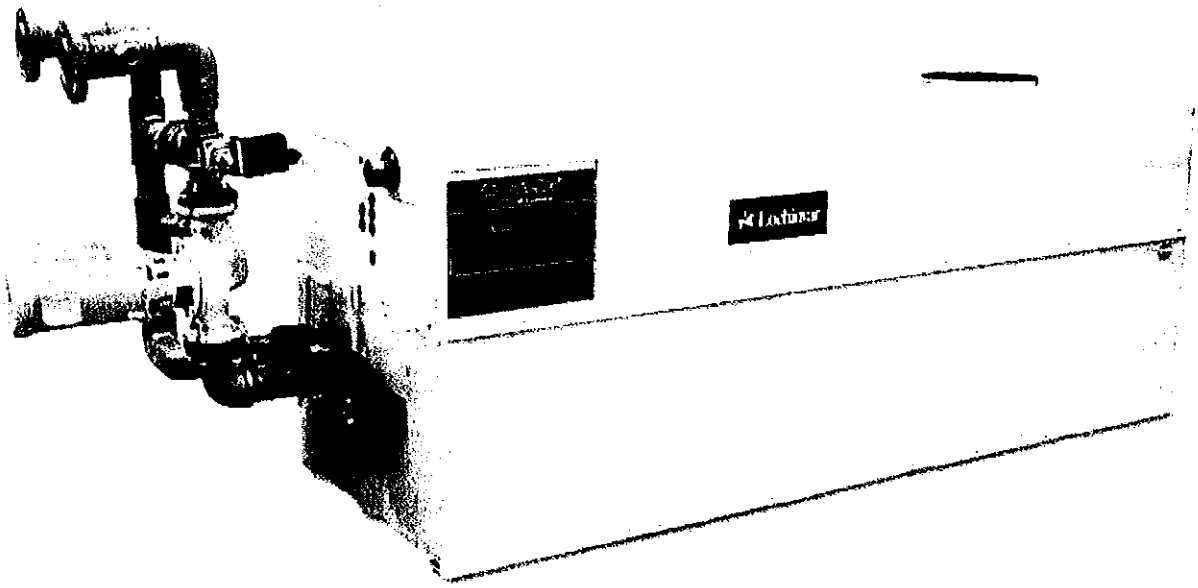
Lochinvar model CPN2071 natural gas heaters (1,999,999 Btu input per hour each), with cupro nickel heat exchanger, pump delay with maintenance timer, auto pumped bypass with flanged connections and California Code controls. Does not include any venting kits, venting materials, powered fans, etc. Includes factory start up and operator training.

Knorr Systems, Inc. • 2221 Standard Avenue • Santa Ana, CA 92707
(714) 754-4044 • (714) 754-7791

Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

COPPER-FIN²®
Gas Heaters For Commercial Pool Applications

High Efficiency In A Space-Saving Design



From 500,000 to 2,070,000 Btu/hr
Up to 89% Thermal Efficiency
Less Than 30 ppm NOx Rating

LOW NOx Certified

MULTI-STACK

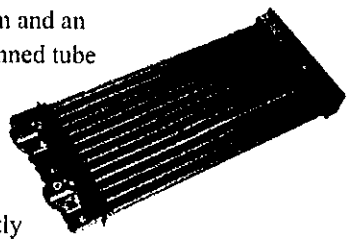
COPPER-FIN²® Commercial Gas Heaters

Thermal Efficiency Is Higher...While Footprint And Vent Sizes Are Smaller

Lochinvar's Copper-Fin²® line of high efficiency commercial gas heaters gives you all the advantages of copper-finned tube heat exchanger technology plus the benefits of a sealed combustion system. Every Copper-Fin² model offers four major advantages: higher efficiency, smaller footprint, smaller vent diameters and a wide variety of venting options.

Outstanding Thermal Efficiency

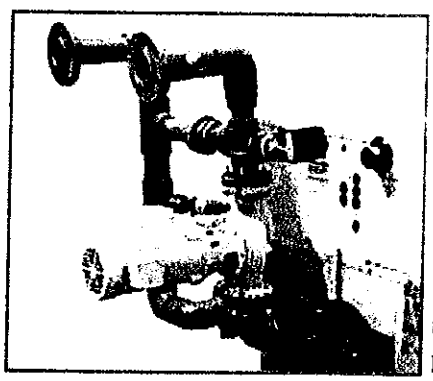
Copper-Fin² gas heaters offer a remarkably high 89% thermal efficiency. This means that 89¢ out of every fuel dollar goes into heating the water, dramatically reducing the operating cost of the equipment. Copper-Fin² achieves this efficiency through the combination of an advanced fan assisted combustion system and an exclusive gasketless copper-finned tube heat exchanger. A time tested and proven combination.



The heat energy from the combustion process is efficiently transferred into the water as it passes through the solid copper-finned tube heat exchanger. The sealed combustion design of the Copper-Fin² reduces external heat loss. This means that the energy dollars heat the water, not the mechanical room. It also ensures that the jacket stays cooler, providing greater safety and requiring less clearance from combustible walls - just 1" in most cases.

Automatic Pumped Bypass Standard

All Copper-Fin² heaters are equipped with an automatic high temperature CPVC pumped bypass to ensure proper flow and return water temperatures to the heater. This results in longer equipment life and trouble free operation. The CPVC bypass is provided as standard equipment in a horizontal configuration. A vertical configuration is also available offering the flexibility to meet mechanical room space requirements or piping constraints.

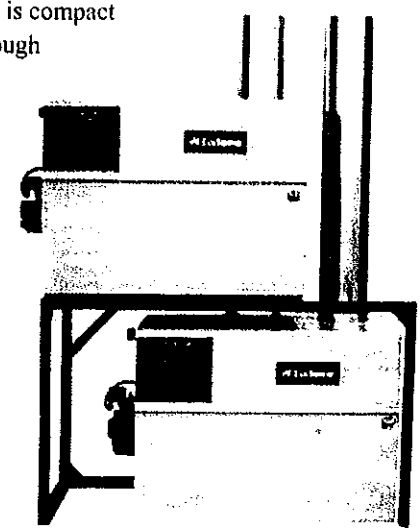


Meets The Toughest Air Quality Standards

Because of our unique fan-assisted combustion process, the Copper-Fin² exceeds today's toughest NO_X emissions requirements. An independent certification laboratory test gave us a rating of less than 30 ppm —corrected to 3% O_2. And less NO_X means a cleaner environment.

Compact Design - For Installation Ease

The Copper-Fin² is compact enough to fit through standard 36" doorways with ease. Even our 2 million Btu/hr model is only 33-1/2" wide. This space-saving design frees up more space in the mechanical room.



MULTI-STACK

And our optional Multi-Stack™ frame lets you put two units in the footprint of just one. See Multi-Stack frame literature for more details. (Indoor use only)

Making Installation Easier...For Less

High-efficiency, fan-assisted combustion means you can use a smaller diameter vent stack — up to 8" smaller than typically required. This makes installation less expensive and more flexible.

Vent Cost Savings

Btu/hr INPUT	CONVENTIONAL VENT SIZE	COPPER-FIN² VENT SIZE	SAVINGS*
500,000	10"	6"	$ 657
650,000	12"	8"	$ 731
750,000	14"	8"	$ 1,450
990,000	16"	10"	$ 1,790
1,260,000	16"	12"	$ 1,463
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Comparison based on 25' vent system using Type "B" double wall vent material, storm collar and vent cap.

The Proven Performers

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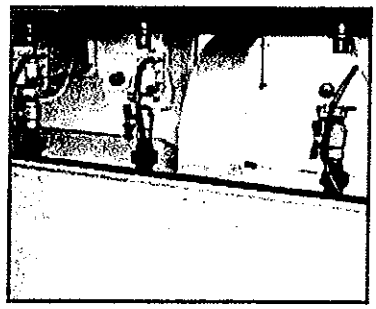
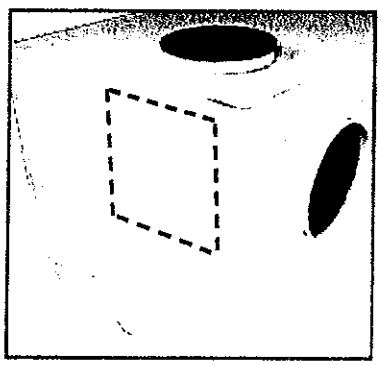
All Copper-Fin^2 models offer a service friendly design with gas inlet and shutoff cocks, electrical and EMS connections toward the front of the unit, and a slide out control panel. The referenced gas valve design improves operational performance by monitoring the pressure in the sealed combustion chamber to maintain the optimum air/fuel mixture.



All models feature alternate air inlet connections for greater installation flexibility. This field convertible option provides the ability to connect the air inlet on either the right side or the rear of the unit. And the built-in air inlet filter reduces maintenance and improves performance by trapping dust and airborne particulates that can foul the burners and blowers.



You'll also save installation time and expense with Lochinvar's direct vent option, featuring our innovative Aire-Lock™ combustion system. The Aire-Lock™ direct vent option allows the installer to vent the products of combustion directly through a side wall without the use of an auxiliary power vent cap. By using approved vent material and an air intake pipe, this option effectively "detaches" the unit from the mechanical room by pulling all combustion air from outside the building and venting all combustion by-products outside through a side wall. A feature that can really simplify an installation while reducing overall installed costs.

Control at your fingertips

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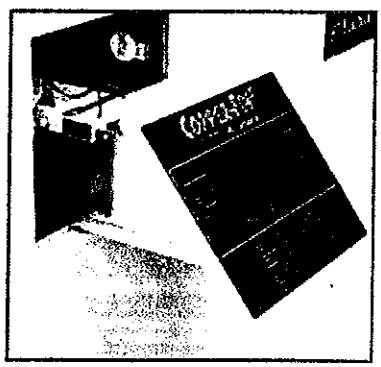
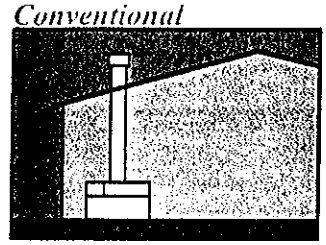


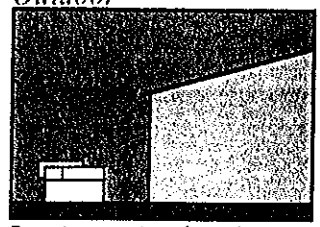
Flexible Venting Options

Conventional



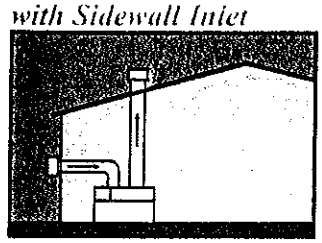
Vents into conventional flue or vent breaching using Type B double wall vent.

Outdoor



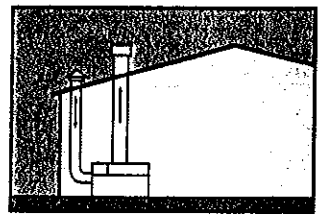
Requires optional outdoor vent cap. Use when indoor space is a problem or if outdoor location gives better access.

DirectAire Vertical with Sidewall Inlet



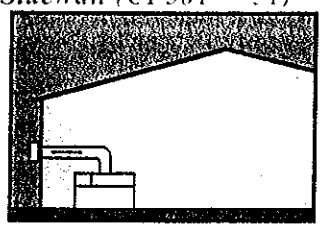
Draws fresh air from outside and vents through conventional vertical flue.

DirectAire Vertical



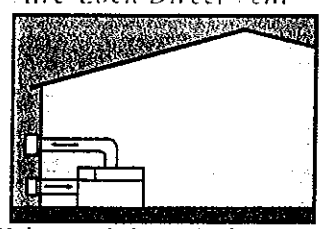
Draws fresh air from outside and vents through conventional vertical flue.

Sidewall (CP501 - 751)



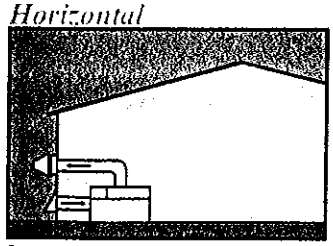
Draws fresh air from inside the room. Vents up to 50 equivalent feet directly through the outside wall without the need for a powered sidewall cap.

Aire-Lock Direct Vent



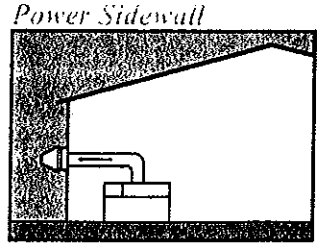
Utilizes sealed Aire-Lock combustion system to draw fresh air 50 equivalent feet from a sidewall. Vents horizontally up to 50 equivalent feet through the sidewall using Category IV approved vent material.

Power DirectAire Horizontal



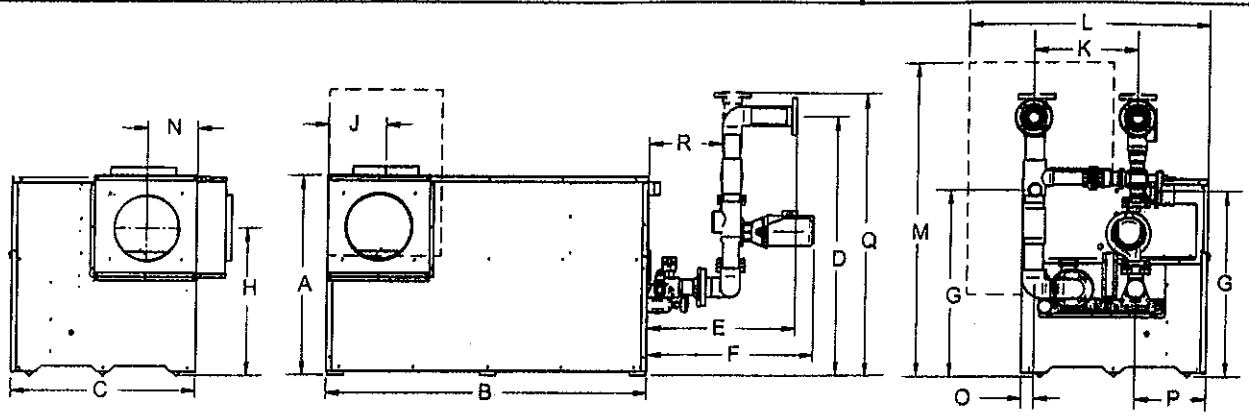
Draws fresh air from outside and vents through sidewall using optional powered vent cap.

Power Sidewall



Vents directly through the outside wall using an optional powered sidewall cap. Ideal when a vent stack is not practical.

COPPER-FIN² Commercial Gas Heater Dimensions & Specifications



Model Number	Btu/hr Input	Btu/hr Output	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	Vent Size	Air Inlet	Gas Conn	Shipping Weight
CPN501	500,000	445,000	31-1/2"	45-1/2"	22-1/4"	38"	20-1/4"	26-1/2"	29"	23"	7"	12-3/4"	28"	38"	8"	1/2"	9"	41-1/8"	9-3/4"	6"	6"	1-1/4"	480
CPN651	650,000	578,500	31-1/2"	56-3/4"	22-1/4"	38"	20-1/4"	26-1/2"	29"	23"	8-1/2"	12-3/4"	38"	38"	8"	1/2"	9"	41-1/8"	9-3/4"	8"	8"	1-1/4"	550
CPN751	750,000	667,500	31-1/2"	64"	22-1/4"	38"	20-1/4"	26-1/2"	29"	23"	8-1/2"	12-3/4"	38"	38"	8"	1/2"	9"	41-1/8"	9-3/4"	8"	8"	1-1/4"	605
CPN0991	990,000	881,100	36"	48-1/4"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	8"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	10"	10"	2"	930
CPN1261	1,260,000	1,121,400	36"	58-1/2"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	9"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	12"	12"	2"	995
CPN1441	1,440,000	1,281,600	36"	68-3/4"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	9"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	12"	12"	2"	1,130
CPN1801*	1,800,000	1,602,000	36"	82-1/4"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	10"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	14"	12"	2"	1,285
CPN2071*	2,070,000	1,842,300	36"	92-1/2"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	10"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	14"	12"	2"	1,400

Notes: *Change "N" to "L" for LP gas models. No deration on LP models.*
*Performance data is based on manufacturer test results. *Cupro Nickel Heat Exchanger is standard on these models.*

Standard Features

- Up to 89% Thermal Efficiency
- Digital Operator Interface
- Less Than 30 ppm NOx Rating
- ASME Gasketless Copper Finned-Tube Heat Exchanger (CP501-1441)
- ASME Gasketless Cupro Nickel Finned-Tube Heat Exchanger (CP1801-2071)
- High Temperature CPVC Automatic Pumped Bypass
- Flanged Inlet/Outlet Fittings
- Loch-Heat™ Ceramic Tile Sealed Combustion Chamber
- Combustion Air Filter
- Field Convertible Air Inlet Connection
- Programmable Temperature Setpoint
- Inlet & Outlet Temperature Sensor
- Pool Temperature Sensor
- Hot Surface Ignition System
- Stainless Steel Burners
- Referenced Gas Valves
- ASME 160 psi Working Pressure
- 110°F Safety Limit
- 24V Controls
- Flow Switch
- Air Pressure Switch
- Remote Control Compatible
- Adjustable High Limit w/ Manual Reset
- 150 psi ASME Temperature and Pressure Relief Valve
- Slide-Out Control Panel with Plug-In Components
- 5-Year Limited Warranty on Heat Exchanger (See warranty for details)

Optional Equipment

- Alarm Bell
- Cupro Nickel Heat Exchanger (CP501-1441)
- High Gas Pressure Switch w/ Manual Reset
- Low Gas Pressure Switch w/ Manual Reset
- Multi-Stack Frame (Horizontal Bypass Only)
- Pump Delay
- Pump Purge w/ Maintenance Timer
- Vertical Mounted Pumped Bypass

Available Firing Systems

F9	Electronic Control with Hot-Surface Ignition (Standard)
F13	GE GAP/FM/IRI
F7	California Code

Venting Options

- Aire-Lock Direct Vent Sealed Combustion
- Conventional
- DirectAire® Vertical
- DirectAire® Vertical w/ Sidewall Inlet
- Outdoor
- Powered DirectAire® Horizontal
- Powered Sidewall
- Sidewall (CP501-751)

FOR EASE IN ORDERING BY MODEL NUMBER

CP	N	501	F9
MODEL	FUEL TYPE	Btu/hr INPUT	FIRING CONTROLS

This heater is 500,000 Btu/hr natural gas Copper-Fin² pool heater. It has F9 firing controls.

Lochinvar® High Efficiency Water Heaters, Boilers and Pool Heaters

AHRI MEMBER

Lochinvar Corporation • 300 Maddox Si... 615-889-8900 / Fax: 615-547-1000

Submittal Data

for

College of San Mateo

Section 131106, 2.11B
Swimming Pool Heater

Qty. 1
Lochinvar model CPN1441

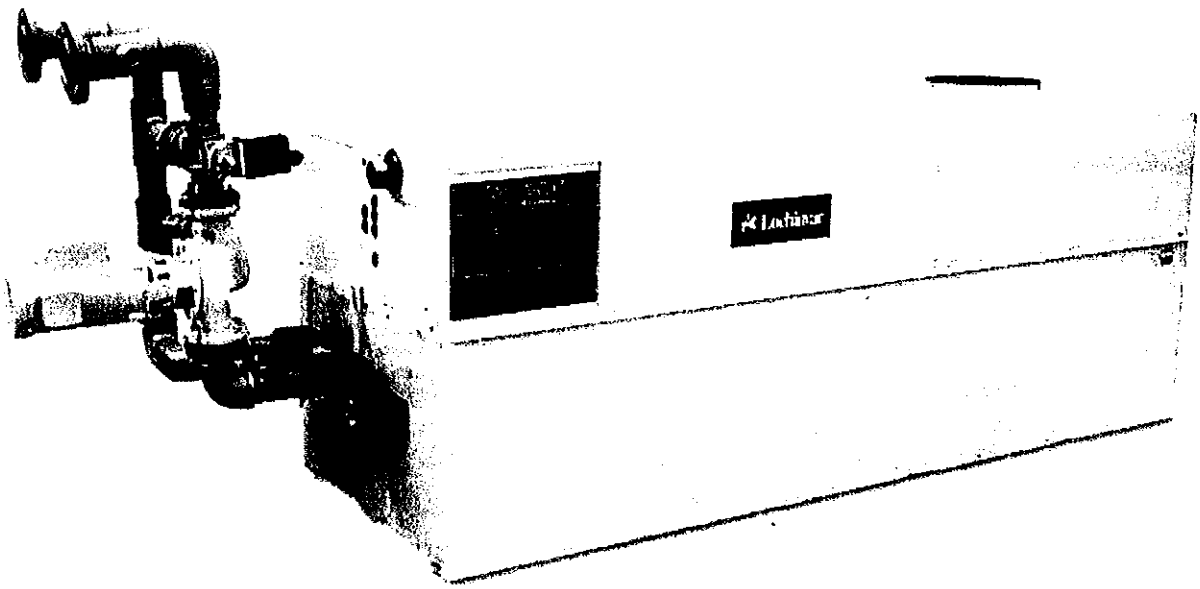
Lochinvar model CPN1441 natural gas heater (1,440,000 Btu input per hour), with cupro nickel heat exchanger, pump delay with maintenance timer, auto pumped bypass with flanged connections and California Code controls. Does not include any venting kits, venting materials, powered fans, etc. Includes factory start up and operator training.

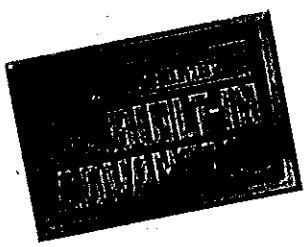
Knorr Systems, Inc. • 2221 Standard Avenue • Santa Ana, CA 92707
(714) 754-4044 • (714) 754-7791

Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

COPPER-FIN2®
Gas Heaters For Commercial Pool Applications

High Efficiency In A Space-Saving Design





From 500,000 to 2,070,000 Btu/hr
Up to 89% Thermal Efficiency
Less Than 30 ppm NOx Rating

LOW NOx Certified

MULTI-STACK

104
104

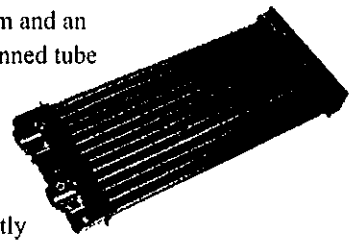
COPPER-FIN²® Commercial Gas Heaters

Thermal Efficiency Is Higher...While Footprint And Vent Sizes Are Smaller

Lochinvar's Copper-Fin²® line of high efficiency commercial gas heaters gives you all the advantages of copper-finned tube heat exchanger technology plus the benefits of a sealed combustion system. Every Copper-Fin² model offers four major advantages: higher efficiency, smaller footprint, smaller vent diameters and a wide variety of venting options.

Outstanding Thermal Efficiency

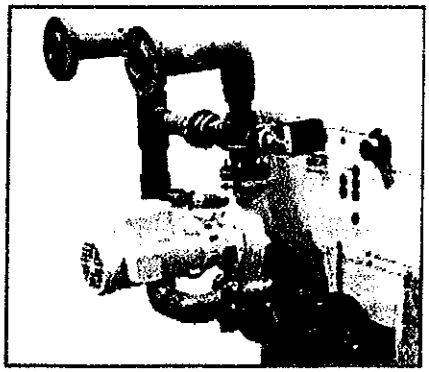
Copper-Fin² gas heaters offer a remarkably high 89% thermal efficiency. This means that 89¢ out of every fuel dollar goes into heating the water, dramatically reducing the operating cost of the equipment. Copper-Fin² achieves this efficiency through the combination of an advanced fan assisted combustion system and an exclusive gasketless copper-finned tube heat exchanger. A time tested and proven combination.



The heat energy from the combustion process is efficiently transferred into the water as it passes through the solid copper-finned tube heat exchanger. The sealed combustion design of the Copper-Fin² reduces external heat loss. This means that the energy dollars heat the water, not the mechanical room. It also ensures that the jacket stays cooler, providing greater safety and requiring less clearance from combustible walls - just 1" in most cases.

Automatic Pumped Bypass Standard

All Copper-Fin² heaters are equipped with an automatic high temperature CPVC pumped bypass to ensure proper flow and return water temperatures to the heater. This results in longer equipment life and trouble free operation. The CPVC bypass is provided as standard equipment in a horizontal configuration. A vertical configuration is also available offering the flexibility to meet mechanical room space requirements or piping constraints.



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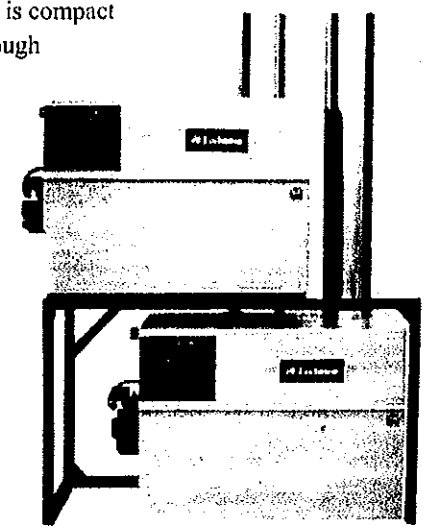

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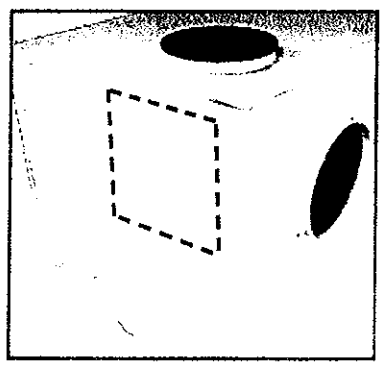

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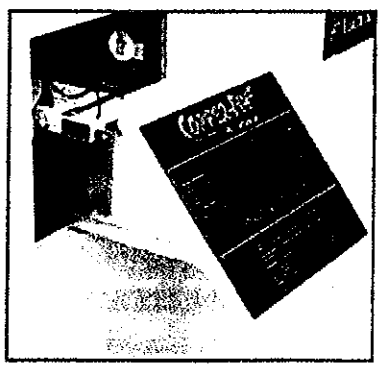
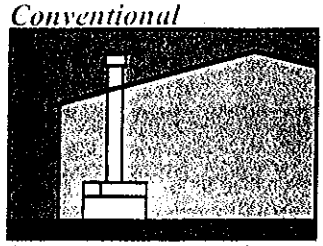


Flexible Venting Options

Conventional



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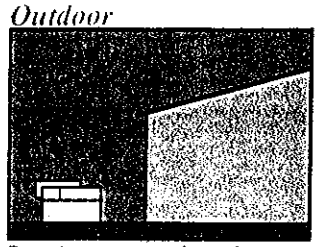
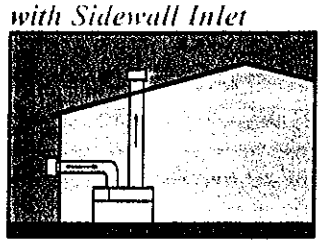
Outdoor



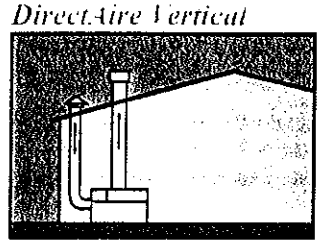
Requires optional outdoor vent cap. Use when indoor space is a problem or if outdoor location gives better access.

DirectAire Vertical with Sidewall Inlet



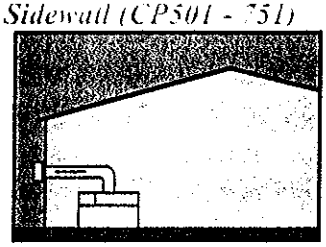
Draws fresh air from outside and vents through conventional vertical flue.

DirectAire Vertical



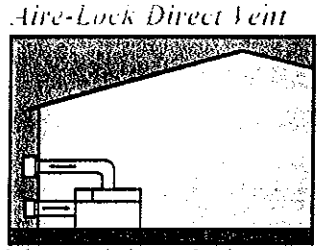
Draws fresh air from outside and vents through conventional vertical flue.

Sidewall (CP501 - 751)



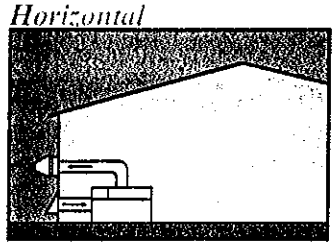
Draws fresh air from inside the room. Vents up to 50 equivalent feet directly through the outside wall without the need for a powered sidewall cap.

Aire-Lock Direct Vent



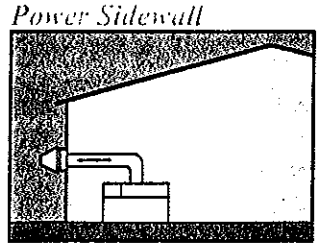
Utilizes sealed Aire-Lock combustion system to draw fresh air 50 equivalent feet from a sidewall. Vents horizontally up to 50 equivalent feet through the sidewall using Category IV approved vent material.

Power DirectAire Horizontal



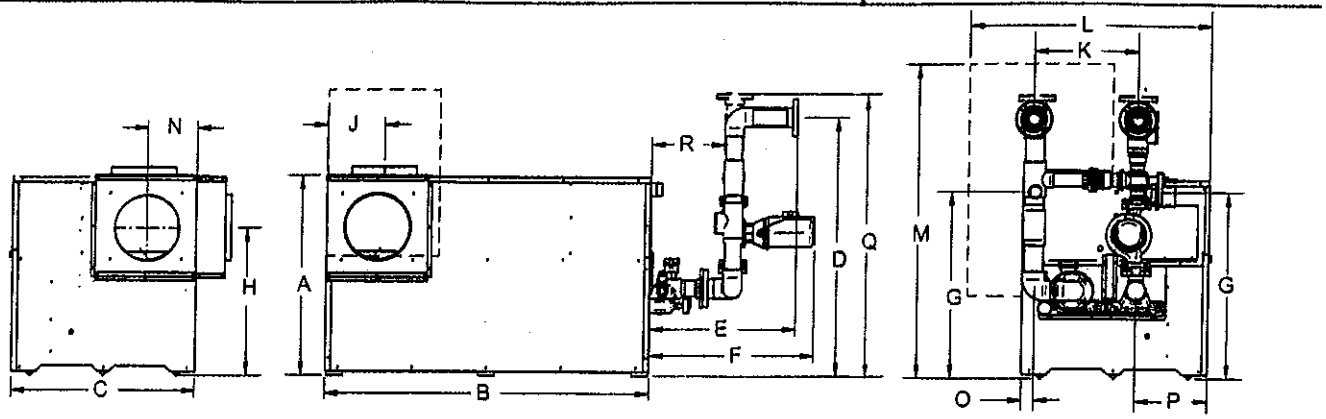
Draws fresh air from outside and vents through sidewall using optional powered vent cap.

Power Sidewall



Vents directly through the outside wall using an optional powered sidewall cap. Ideal when a vent stack is not practical.

COPPER-FIN² Commercial Gas Heater Dimensions & Specifications



Model Number	Btu/hr Input	Btu/hr Output	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	Vent Size	Air Inlet	Gas Conn	Shipping Weight
CPN501	500,000	445,000	31-1/2"	45-1/2"	22-1/4"	38"	20-1/4"	26-1/2"	29"	23"	7"	12-3/4"	28"	38"	8"	1/2"	9"	41-1/8"	9-3/4"	6"	6"	1-1/4"	480
CPN651	650,000	578,500	31-1/2"	56-3/4"	22-1/4"	38"	20-1/4"	26-1/2"	29"	23"	8-1/2"	12-3/4"	38"	38"	8"	1/2"	9"	41-1/8"	9-3/4"	8"	8"	1-1/4"	550
CPN751	750,000	667,500	31-1/2"	64"	22-1/4"	38"	20-1/4"	26-1/2"	29"	23"	8-1/2"	12-3/4"	38"	38"	8"	1/2"	9"	41-1/8"	9-3/4"	8"	8"	1-1/4"	605
CPN0991	990,000	881,100	36"	48-1/4"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	8"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	10"	10"	2"	930
CPN1261	1,260,000	1,121,400	36"	58-1/2"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	9"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	12"	12"	2"	995
CPN1441	1,440,000	1,281,600	36"	68-3/4"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	9"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	12"	12"	2"	1,130
CPN1801*	1,800,000	1,602,000	36"	82-1/4"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	10"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	14"	12"	2"	1,285
CPN2071*	2,070,000	1,842,300	36"	92-1/2"	33-1/2"	47"	26-3/4"	30-1/4"	34"	27"	10"	18-1/4"	42"	48"	9-1/4"	2-1/4"	13"	51-1/4"	13-1/4"	14"	12"	2"	1,400

Notes: *Change 'N' to 'L' for LP gas models.* *No deration on LP models.*
Performance data is based on manufacturer test results. **Cupro Nickel Heat Exchanger is standard on these models.*

Standard Features

- Up to 89% Thermal Efficiency
- Digital Operator Interface
- Less Than 30 ppm NOx Rating
- ASME Gasketless Copper Finned-Tube Heat Exchanger (CP501-1441)
- ASME Gasketless Cupro Nickel Finned-Tube Heat Exchanger (CP1801-2071)
- High Temperature CPVC Automatic Pumped Bypass
- Flanged Inlet/Outlet Fittings
- Loch-Heat™ Ceramic Tile Sealed Combustion Chamber
- Combustion Air Filter
- Field Convertible Air Inlet Connection
- Programmable Temperature Setpoint
- Inlet & Outlet Temperature Sensor
- Pool Temperature Sensor
- Hot Surface Ignition System
- Stainless Steel Burners
- Referenced Gas Valves
- ASME 160 psi Working Pressure
- 110°F Safety Limit
- 24V Controls
- Flow Switch
- Air Pressure Switch
- Remote Control Compatible
- Adjustable High Limit w/ Manual Reset
- 150 psi ASME Temperature and Pressure Relief Valve
- Slide-Out Control Panel with Plug-In Components
- 5-Year Limited Warranty on Heat Exchanger (See warranty for details)

Optional Equipment

- Alarm Bell
- Cupro Nickel Heat Exchanger (CP501-1441)
- High Gas Pressure Switch w/ Manual Reset
- Low Gas Pressure Switch w/ Manual Reset
- Multi-Stack Frame (Horizontal Bypass Only)
- Pump Delay
- Pump Purge w/ Maintenance Timer
- Vertical Mounted Pumped Bypass

Available Firing Systems

F9	Electronic Control with Hot-Surface Ignition (Standard)
F13	GE GAP/FM/IRI
F7	California Code

Venting Options

- Aire-Lock Direct Vent Sealed Combustion
- Conventional
- DirectAire® Vertical
- DirectAire® Vertical w/ Sidewall Inlet
- Outdoor
- Powered DirectAire® Horizontal
- Powered Sidewall
- Sidewall (CP501-751)

FOR EASE IN ORDERING BY MODEL NUMBER

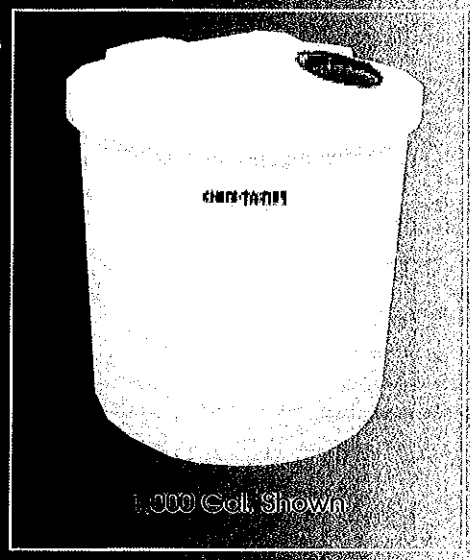
CP	N	501	F9
MODEL	FUEL TYPE	Btu/hr INPUT	FIRING CONTROLS

This heater is 500,000 Btu/hr natural gas Copper-Fin2 pool heater. It has F9 firing controls.

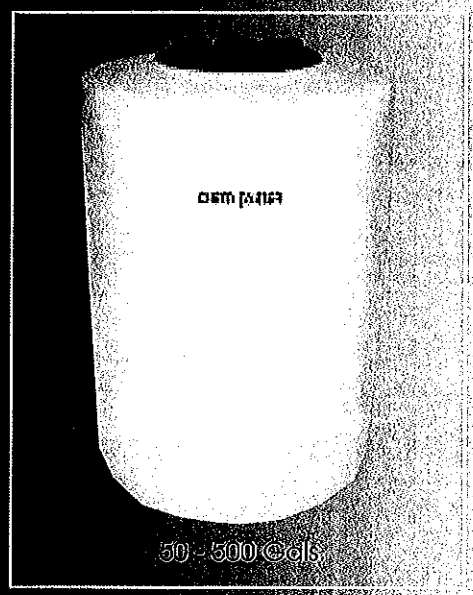
Lochinvar® High Efficiency Water Heaters, Boilers and Pool Heaters

AHRI MEMBER

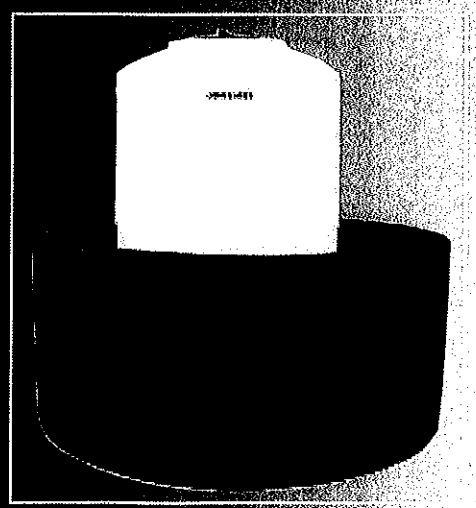
Lochinvar Corporation • 300 Maddox Si • 615-889-8900 • Fax: 615-547-1000



1,000 Gal. Shown



50 - 500 Gals.



Qty. 2 ChemTainer TC5971DC
500 gallon dual wall chlorine storage tank with 2" bulkhead fitting (with gaskets) and 90 degree cam lock fitting for chemical delivery.

DC Series – Outer containment tank capacity complies with federal regulation 40CFR-264.193 requirements.

- Save valuable floor space.
- Enclosed design prevents rain, snow and debris from collecting in containment tank.
- Sizes ranging from 50 to 6,000 gallons.

➤ Denotes New Size: Designed to fit through narrow doors/openings

CAPACITY (GAL)*	SIZE DIA. X HT. (IN.)	VENTED MANWAY (IN.)	FOB POINTS (1)
50 ➤	27 x 38	8	N
100	35 x 39	16	NC
150	34 x 48	16	NC
200	41 x 52	16	NC
350	52 x 56	16	NC
500	59 x 71	16	NC
1000	74 x 85	16	C,Tn
2000	86x156	16	Tn
3000	120x116	16	Tn
4000	120 x165	16	Tn
5000	120 x181	16	Tn
6000	120 x198	16	Tn

* Capacity of the primary tank.
(1) Subject to stocking inventory
➤ Denotes New Size
DC Series transition fittings available. See price sheet.

Containment Basins

OA Series

- Excellent chemical and impact resistance.
- Capacities listed are the maximum for the containment basin. The containment basin capacity must be at least 10% greater than that of the primary tank.
- Check local regulations.

CAPACITY (GAL)	SIZE DIA. X HT. (IN.)	FOB POINTS (1)
385	64 x 33	CIPF,Tn
675	66 x 46	NF
675	82 x 30	F
950	64 x 70	CIP,Tn
950	86 x 38 (2)	CIP,Tn
1000	84 x 46	NF
1150	72 x 72 x 66 rect.	F
1250	96 x 96 x 40 tapered	F
1415	96 x 96 x 44 tapered	F
1450	84 x 84 x 48 rect.	F
1500	86 x 60 (2)	CIPF,Tn
1800	84 x 84 x 60 rect.	F
2000	86 x 81 (2)	CIP,Tn
2075	96 x 96 x 62 tapered	F
2450	95 x 85	CIP,Tn
2975	95 x 97 (2)	CIP,Tn
4250	120 x 87 (2)	CIP,Tn
4650	120 x 97 (2)	CIP,Tn
5700	120 x 117 (2)	CIP,Tn
6800	120 x 150 (2)	CIP,Tn
7500	141 x 125	Tn
8750	141 x 135	Tn

Basins are supplied in black linear polyethylene. Available in translucent while, please contact sales office.
(1) Subject to stocking inventory
(2) Internal Flange

Review tank handling, installation & use guidelines, pg. 20.
of translucency varies with wall thickness and tank color.
are nominal. Capacities indicate approximate volume.
n molded tanks indicate approx. vol. •Tanks UV stabilized for outdoor use.
emtainer.com for updated product information.

Knorr Systems
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

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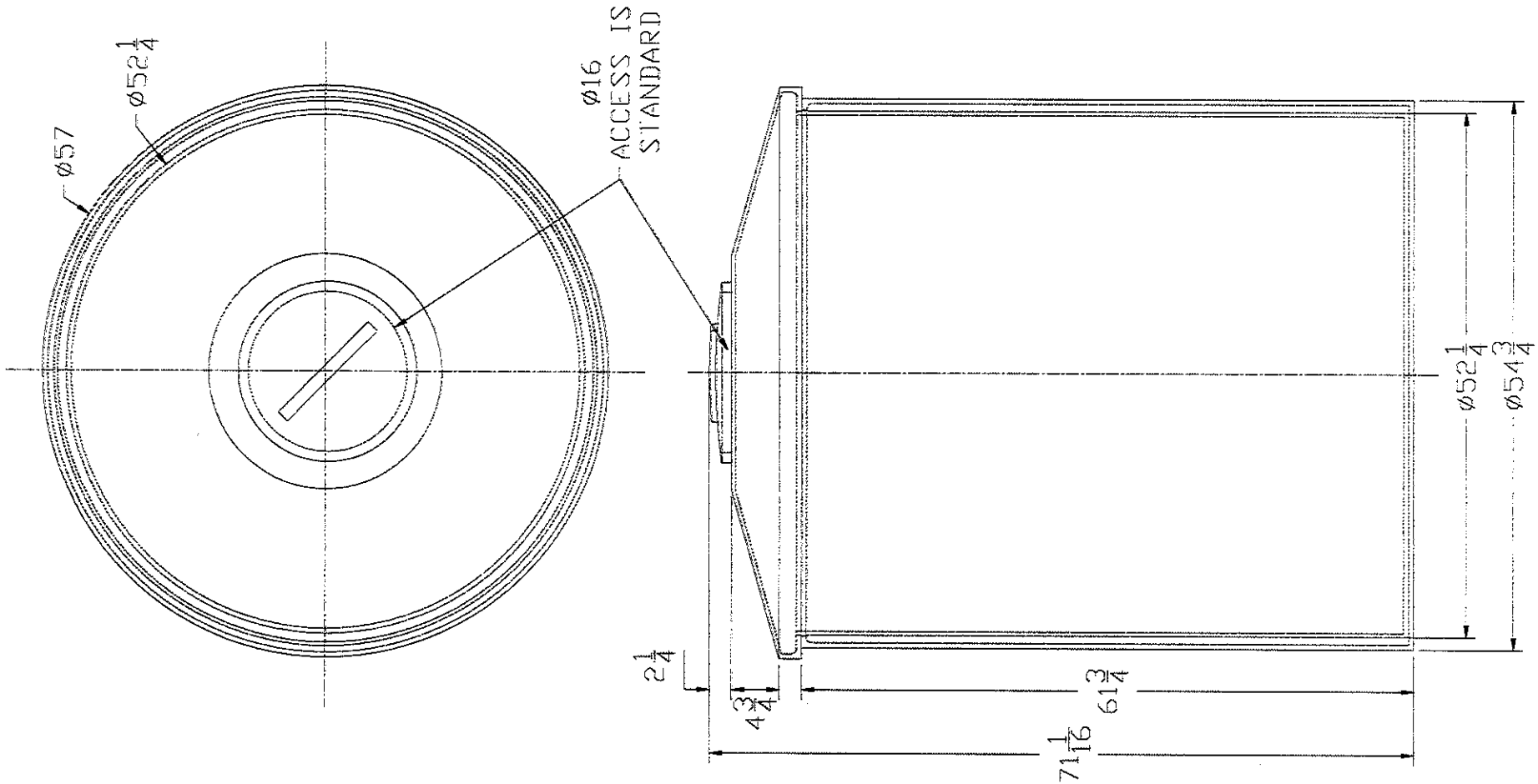


Rev. 2	Date 08/25/00	File Name DC5971-5

CHEM-TAINER Industries Inc.
361 Neptune Ave. W. Babylon, NY 11704
(631) 661-8300 Fax: (631) 661-8209

Date 12/15/99	Mold Location CA
Drawn By: IIA	Cust. Rep.

TITLE
500 GALLONS DOUBLE WALL CONTAINMENT TANK

Part # TC5971DC	Dwg. # C-5971-15

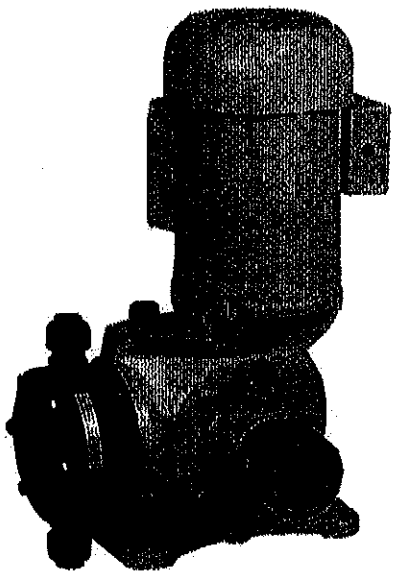
ALL DIMENSIONS SHOWN ARE OUTSIDE PART DIMENSIONS IN INCHES, AND VARY BY THE STANDARD ROTATIONAL MOLDING TOLERANCE OF ±2%.

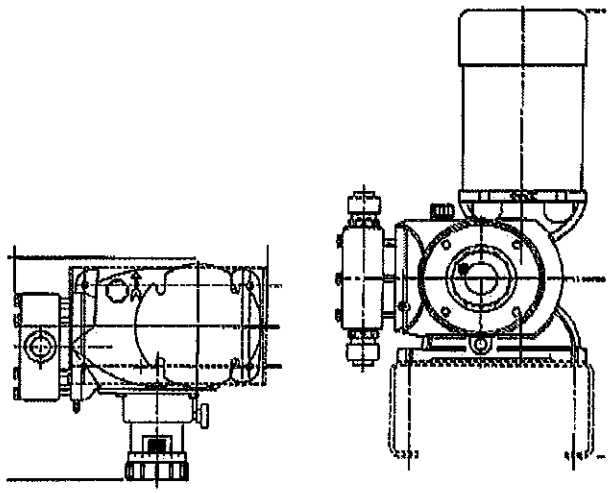
Qty. 2 LMI SD43-88P-KSI Competition Pool motor driven feed pump for chlorine, with FRP shelf bracket

SERIES SD

Motor-Driven Metering Pumps

SPECIFICATIONS:	
MODEL	SD43-88P-KSI
VOLTAGE	115VAC, 1PH, 60HZ
OUTPUT	12 GPH (45 LPH)
PRESSURE	150PSI (10 BAR)
MATERIALS OF CONSTRUCTION	
HEAD	PVC
VALVES	PVDF
SEALS	AFLAS
SEATS	PTFE
DIAPHRAGM	PTFE
BALLS	CERAMIC
CONNECTIONS	1/2" OD TUBING





DIMENSIONS	
HEIGHT	12 1/4"
LENGTH	10 3/4"
WIDTH	8 1/4"
WEIGHT	45 LBS.
Drawing shown with optional pump base (6 3/4" tall)	

Dimensions Approximate for envelope estimations. Certified prints are available.

LMI MILTON ROY

Presented by: Knorr Systems, Inc.
2221 Standard Ave.
Santa Ana, CA 92707
714-754-4044

Qty. 1 LMI C121-362SI
Swimming Pool chemical feed pump for chlorine, with FRP shelf bracket

Data Sheet

Series C
Electronic Metering Pumps

Configuration Data

Model C92 1 - 363SI

Control & Output Code

Manual Control
Speed (stroking frequency) and stroke length manually adjustable.

C10 --- 1.3 GPH (4.9 l/h) ... 300 psi (20.7 Bar)
C11 --- 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C12 --- 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C13 --- 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C14 ---- 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)

Instrument Responsive/Manual Control
Manual adjustment features of C1 Series plus switch conversion to external control for automatic systems.

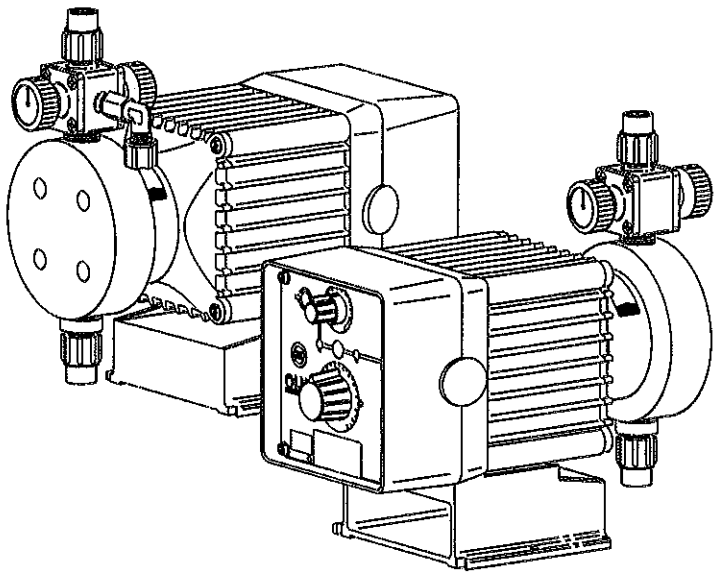
C70 --- 1.3 GPH (4.9 l/h) ... 300 psi (20.7 Bar)
C71 --- 2.5 GPH (9.5 l/h) ... 150 psi (10.3 Bar)
C72 --- 4.0 GPH (15.1 l/h) ... 100 psi (6.9 Bar)
C73 --- 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C74 ---- 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)
C76 --- 4.0 GPH (15.1 l/h) .... 175 psi (12.1 Bar)
C77 ---- 10 GPH (38 l/h) ..... 80 psi (5.5 Bar)
C78 ---- 25 GPH (95 l/h) ..... 30 psi (2.07 Bar)
C90 --- 1.3 GPH (4.9 l/h) .... 300 psi (20.7 Bar)
C91 --- 2.5 GPH (9.5 l/h) .... 150 psi (10.3 Bar)
C92 --- 4.0 GPH (15.1 l/h) .... 100 psi (6.9 Bar)
C93 --- 8.0 GPH (30 l/h) ..... 60 psi (4.1 Bar)
C94 ---- 20 GPH (76 l/h) ..... 25 psi (1.7 Bar)

Voltage Code

1 -------- 120 VAC US Plug
2 -------- 240 VAC US Plug
3 -------- 220-240 VAC DIN Plug
5 -------- 240-250 VAC, UK Plug
6 -------- 240-250 VAC, AUST/NZ Plug
7 -------- 220-240 VAC, SWISS Plug

Liquid End

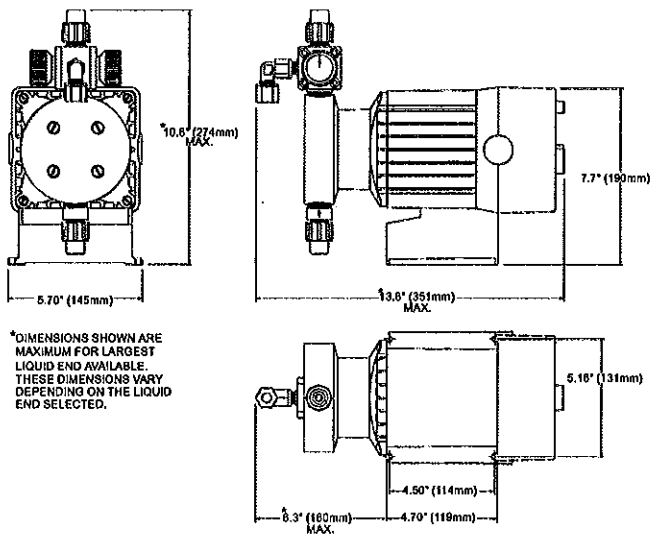
See next page for complete liquid end specifications and selection.



Specifications

Series	Strokes Per Minute (Adjustable) Min	Max	Stroke Length (Adjustable) Recommended Minimum	Average Input Power @Max Speed	Shipping Weight
C10, C70, C90 C11, C71, C91 C12, C72, C92 C13, C73, C93 C14, C74, C94	1	100	10%	44 watts	20 lbs (9.1 kg)
C76 C77 C78	1	100	10%	87 watts	28 lbs (12.7 kg)

Dimensions



*DIMENSIONS SHOWN ARE MAXIMUM FOR LARGEST LIQUID END AVAILABLE. THESE DIMENSIONS VARY DEPENDING ON THE LIQUID END SELECTED.

LMI MILTON ROY

Knorr Systems
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

Replaces same of Rev.D 10/99
1712.E 11/01

Configuration Data & Materials of Construction

Drive Assembly	Liquid End No.	Size Code	Materials of Construction: Head & Fittings	Balls	Liquifram™	Check Valve	Accessory	Tubing & Connections: Discharge	Suction
C90 ■ -	498SP	0.9	PVC	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
C70 ■ -	297	0.9	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
C10 ■ -									
	468SI	1.8	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
	460SI†	1.8	Acrylic / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
	460FI	1.8	Acrylic / PVC	PTFE	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375 O.D.	
	368SI†	1.8	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C92 ■ -	362SI†	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C91 ■ -	363SI†	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .375" O.D.	
C72 ■ -	75HV	1.8	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
C71 ■ -	75S*	1.8	Polypropylene	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	
C12 ■ -	76HV	1.8	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
C11 ■ -	79	1.8	UHMW PE	Ceramic	Hypalon®	Hypalon®		PE .5" O.D.	Vinyl .5" O.D.
	277	1.8	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
	418SI#	3.0	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
	410SI†#	3.0	Acrylic / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
	410FI†#	3.0	Acrylic / PVC	PTFE	Fluorofilm™	PVDF / Polyprel®	3FV	PE .5" O.D.	
C93 ■ -	318SI†#	3.0	PVC / PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
C73 ■ -	313SI†#	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / PTFE	4FV	PE .5" O.D.	
C13 ■ -	312SI†#	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .5" O.D.	
	20HV	3.0	Acrylic / PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
	22	3.0	PVDF	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	22P	3.0	PVDF	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	24	3.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25HV	3.0	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
	25P	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25T	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	27	3.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	29	3.0	UHMW PE	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	
	30	6.0	Acrylic/PVC	Ceramic	Fluorofilm™	PTFE		PE .5" O.D	Vinyl .5" O.D.
	32	6.0	PVDF	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
C94 ■ -	32P	6.0	PVDF	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C78 ■ -	34	6.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C74 ■ -	35P	6.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
C14 ■ -	35T	6.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	36	6.0	PVC	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	37	6.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	468SP	1.8	PVC/PVC	Ceramic	Fluorofilm™	PVDF / Polyprel®	4FV	PE .375" O.D.	
C76 ■ -	74S	1.8	Polypropylene	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
	277	1.8	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
	20HV	3.0	Acrylic/PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
	20S**	3.0	Acrylic/PVC	Ceramic	Fluorofilm™	Hypalon®	4FV	PE .5" O.D.	Vinyl .5" O.D.
	22	3.0	PVDF	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	22P	3.0	PVDF	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/2" NPT M	
C77 ■ -	24	3.0	PVC	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25HV	3.0	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
	25P	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	25T	3.0	Polypropylene	Ceramic	Fluorofilm™	PTFE		PE .5" O.D.	
	26S**	3.0	PVC	Ceramic	Fluorofilm™	Viton®	4FV	PE .5" O.D.	
	27	3.0	316 S.S.	316 S.S.	Fluorofilm™	PTFE		Pipe 1/2" NPT M	
	29	3.0	UHMW PE	Ceramic	Fluorofilm™	Hypalon®		PE .5" O.D.	

■ See front page for voltage code specifications.
**These Liquid Ends are available without a 4FV, simply drop the 'S' at the end of the Liquid End number to order the model without a 4FV.
#These liquid ends use 3/8" diameter balls. Pump output may be reduced in some applications.

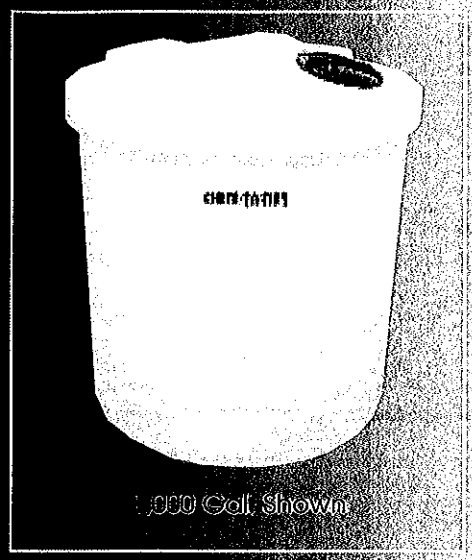
†To specify ¼" NPT male, change 'I' to 'P'. To specify black, UV resistant tubing, change 'I' to 'U'. To specify Bleed 4FV, change 'S' to 'B'. To specify 3FV, change 'S' to'T'.
Fluorofilm™ is a copolymer of PTFE and PFA.
Polyprel® is an elastomeric PTFE copolymer.

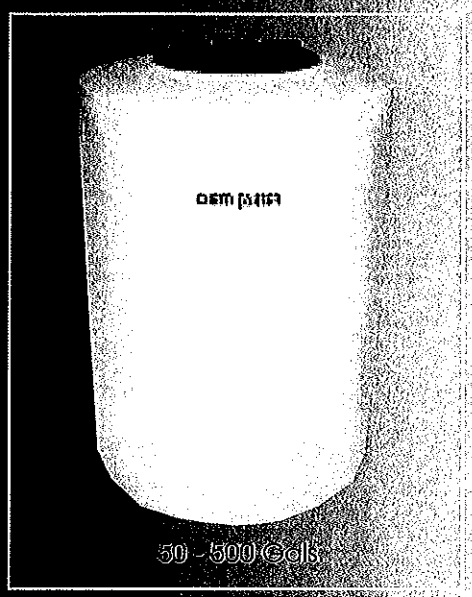
4FV indicates that the pump is equipped with an LMI Four Function Valve. This diaphragm type anti-syphon/pressure relief valve is installed on the pump head. It provides anti-syphon protection and aids in priming, even under pressure.

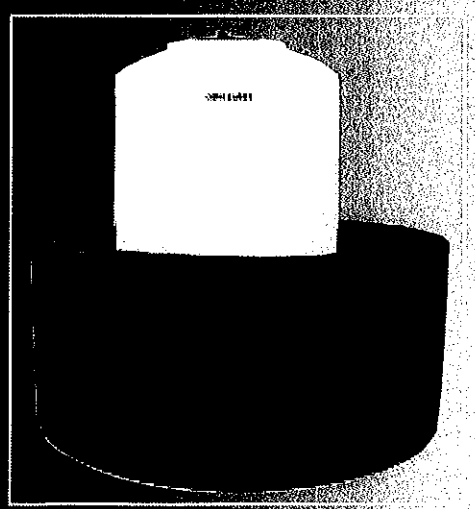
Output Information

Series	Gallons per Hour Min	Gallons per Hour Max	Liters per Hour Min	Liters per Hour Max	mL/cc per Minute Min	mL/cc per Minute Max	mL/cc per Stroke Min	mL/cc per Stroke Max	Maximum Injection Pressure
C10, C70*, C90*	0.001	1.3	0.005	4.9	0.08	82	0.08	0.82	300 psi (20.7 Bar)
C11, C71*, C91*	0.003	2.5	0.010	9.5	0.16	158	0.16	1.58	150 psi (10.3 Bar)
C12, C72*, C92*	0.004	4.0	0.015	15.1	0.25	252	0.25	2.52	100 psi (6.9 Bar)
C13, C73*, C93*	0.008	8.0	0.030	30.0	0.51	505	0.51	5.05	60 psi (4.1 Bar)
C14, C74*, C94*	0.020	20.0	0.076	76.0	1.26	1262	1.26	12.62	25 psi (1.7 Bar)
C76*	0.004	4.0	0.015	15.1	0.25	252	0.25	2.52	175 psi (12.1 Bar)
C77*	0.010	10.0	0.038	38.0	0.63	631	0.63	6.31	80 psi (5.5 Bar)
C78*	0.025	25.0	0.095	95.0	1.58	1577	1.58	15.77	30 psi (2.07 Bar)

*Minimum output is based on 1 stroke per minute and 10% stroke setting, minimum output can be reduced further in external mode. Series C9 pumps may be programmed for strokes per hour for lower outputs.







Qty. 1 ChemTainer TC5971DC
500 gallon dual wall acid storage tank with 2" bulkhead fitting (with gaskets) and 90 degree cam lock fitting for chemical delivery.

DC Series – Outer containment tank capacity complies with federal regulation 40CFR-264.193 requirements.

- Save valuable floor space.
- Enclosed design prevents rain, snow and debris from collecting in containment tank.
- Sizes ranging from 50 to 6,000 gallons.

➤ Denotes New Size: Designed to fit through narrow doors/openings

CAPACITY (GAL)*	SIZE DIA. X HT. (IN.)	VENTED MANWAY (IN.)	FOB POINTS (1)
50 ➤	27 x 38	8	N
100	35 x 39	16	NC
150	34 x 48	16	NC
200	41 x 52	16	NC
350	52 x 56	16	NC
500	59 x 71	16	NC
1000	74 x 85	16	C,In
2000	86x156	16	In
3000	120x116	16	In
4000	120 x165	16	In
5000	120 x181	16	In
6000	120 x198	16	In

* Capacity of the primary tank.
(1) Subject to stocking inventory
➤ Denotes New Size
DC Series transition fittings available. See price sheet.

Containment Basins

OA Series

- Excellent chemical and impact resistance.
- Capacities listed are the maximum for the containment basin. The containment basin capacity must be at least 10% greater than that of the primary tank.
- Check local regulations.

CAPACITY (GAL)	SIZE DIA. X HT. (IN.)	FOB POINTS (1)
385	64 x 33	CIPF,In
675	66 x 46	NF
675	82 x 30	F
950	64 x 70	CIP,In
950	86 x 38 (2)	CIP,In
1000	84 x 46	NF
1150	72 x 72 x 66 rect.	F
1250	96 x 96 x 40 tapered	F
1415	96 x 96 x 44 tapered	F
1450	84 x 84 x 48 rect.	F
1500	86 x 60 (2)	CIPF,In
1800	84 x 84 x 60 rect.	F
2000	86 x 81 (2)	CIP,In
2075	96 x 96 x 62 tapered	F
2450	95 x 85	CIP,In
2975	95 x 97 (2)	CIP,In
4250	120 x 87 (2)	CIP,In
4650	120 x 97 (2)	CIP,In
5700	120 x 117 (2)	CIP,In
6800	120 x 150 (2)	CIP,In
7500	141 x 125	In
8750	141 x 135	In

Basins are supplied in black linear polyethylene. Available in translucent white, please contact sales office.
(1) Subject to stocking inventory
(2) Internal Flange

Review tank handling, installation & use guidelines, pg. 20.
of translucency varies with wall thickness and tank color.
are nominal. Capacities indicate approximate volume.
n molded tanks indicate approx. vol. • Tanks UV stabilized for outdoor use.
emtainer.com for updated product information.

Knorr Systems
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

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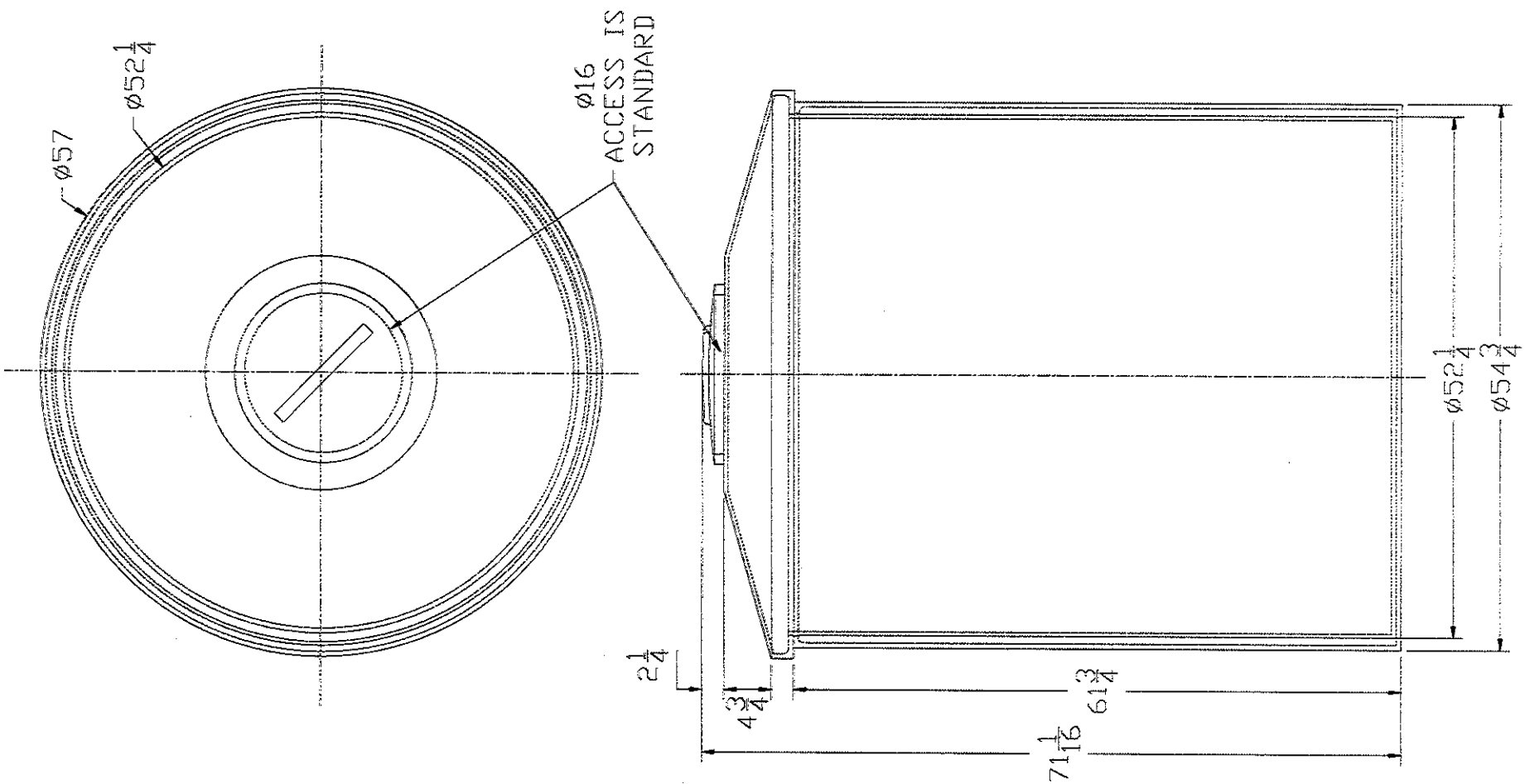

Rev. 2	Date 08/25/00	File Name DC5971-5

CHEM-TAINER Industries Inc.
361 Neptune Ave. W. Babylon, NY 11704
(631) 661-8300 Fax: (631) 661-8209

Date	Mold Location
12/15/99	CA
Drawn By: IIA	Cust. Rep.

TITLE
500 GALLONS DOUBLE WALL CONTAINMENT TANK

Part #	Dwg. #
TC5971DC	C-5971-15

ALL DIMENSIONS SHOWN ARE OUTSIDE PART DIMENSIONS IN INCHES, AND VARY BY THE STANDARD ROTATIONAL MOLDING TOLERANCE OF ±2%.

114
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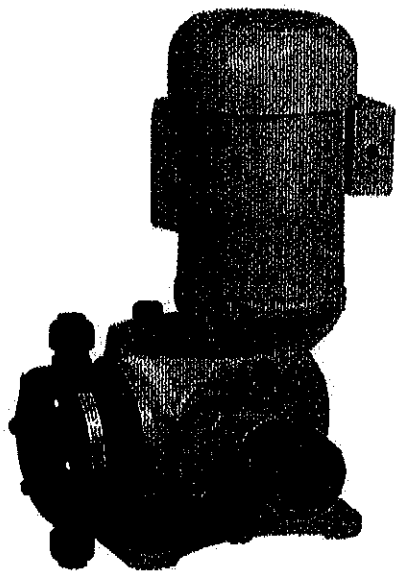
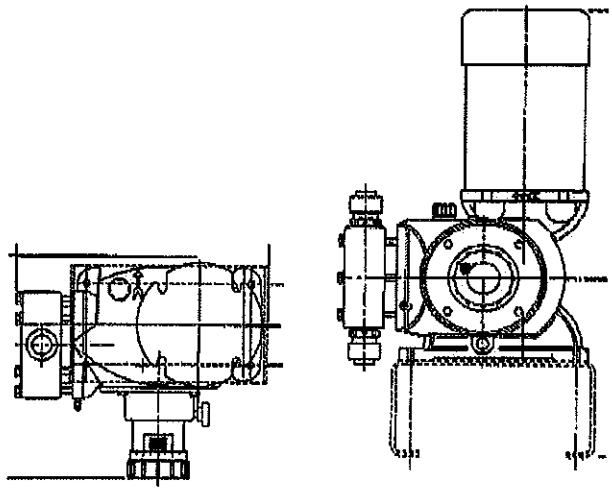
Qty. 1 LMI SD43-88P-KSI Competition Pool motor driven feed pump for acid, with FRP shelf bracket

SERIES SD

Motor-Driven Metering Pumps

SPECIFICATIONS:	
MODEL	SD43-88P-KSI
VOLTAGE	115VAC, 1PH, 60HZ
OUTPUT	12 GPH (45 LPH)
PRESSURE	150PSI (10 BAR)
MATERIALS OF CONSTRUCTION	
HEAD	PVC
VALVES	PVDF
SEALS	AFLAS
SEATS	PTFE
DIAPHRAGM	PTFE
BALLS	CERAMIC
CONNECTIONS	1/2" OD TUBING





DIMENSIONS	
HEIGHT	12 1/4"
LENGTH	10 3/4"
WIDTH	8 1/4"
WEIGHT	45 LBS.
Drawing shown with optional pump base (6 3/4" tall)	

Dimensions Approximate for envelope estimations. Certified prints are available.

LMI MILTON ROY

Presented by: Knorr Systems, Inc.
2221 Standard Ave.
Santa Ana, CA 92707
714-754-4044

Qty. 1 LMI B121-392SI
Swimming Pool chemical feed pump
for acid, with FRP shelf bracket

Data Sheet

Series B

Electronic Metering Pumps

Configuration

Model B92 1 - 392SI

Control & Output Code

Manual Control
Speed (stroking frequency) and stroke length manually adjustable

B11 --- 1.6 GPH	(6.1 l/h)	--- 150 psi	(10.30 Bar)
B12 --- 2.5 GPH	(9.5 l/h)	--- 100 psi	(6.90 Bar)
B13 --- 4.5 GPH	(17.0 l/h)	--- 50 psi	(3.50 Bar)
B14 --- 7.0 GPH	(26.5 l/h)	--- 30 psi	(2.07 Bar)

Instrument Responsive / Manual Control
Manual adjustment features of Series B1 plus switch conversion to external control for automatic systems.

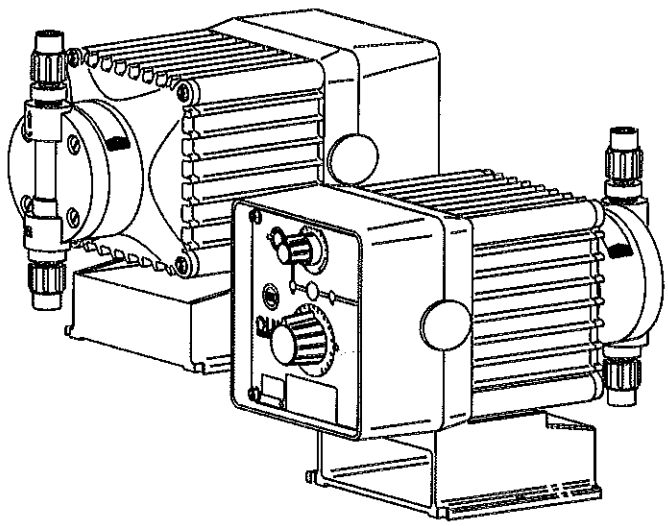
B71 --- 1.6 GPH	(6.1 l/h)	--- 150 psi	(10.30 Bar)
B72 --- 2.5 GPH	(9.5 l/h)	--- 100 psi	(6.90 Bar)
B73 --- 4.5 GPH	(17.0 l/h)	--- 50 psi	(3.50 Bar)
B74 --- 7.0 GPH	(26.5 l/h)	--- 30 psi	(2.07 Bar)
B91 --- 1.6 GPH	(6.1 l/h)	--- 150 psi	(10.30 Bar)
B92 --- 2.5 GPH	(9.5 l/h)	--- 100 psi	(6.90 Bar)
B93 --- 4.5 GPH	(17.0 l/h)	--- 50 psi	(3.50 Bar)
B94 --- 7.0 GPH	(26.5 l/h)	--- 30 psi	(2.07 Bar)

Voltage Code

1 --------- 120 VAC, US Plug
2 --------- 240 VAC, US Plug
3 --------- 220-240 VAC, DIN Plug
5 --------- 240-250 VAC, UK Plug
6 --------- 240-250 VAC, AUST/NZ Plug
7 --------- 220-240 VAC, SWISS Plug

Liquid End

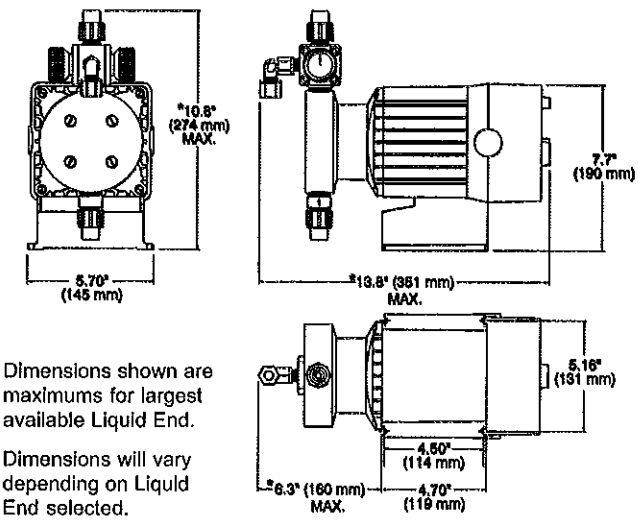
See next page for complete Liquid End specifications and selection.



Specifications

Series	Strokes Per Minute (Adjustable) Min	Max	Stroke Length (Adjustable) Recommended Minimum	Average Input Power @ Max Speed	Shipping Weight
B11, B71, B91 B12, B72, B92 B13, B73, B93 B14, B74, B94	1	100	10%	29 watts	15 lbs (6.9 kg)

Dimensions



* Dimensions shown are maximums for largest available Liquid End.

Dimensions will vary depending on Liquid End selected.

LMI MILTON ROY

Knorr Systems, Inc.
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

ISO9001

Replaces same of Rev. F 3/97
1417. G 2/98

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Configuration Data & Materials of Construction

Drive Assembly	Liquid End No.	Size Code	Materials of Construction: Head & Fittings	Balls	Liquifram™	Check Valve	Accessory	Tubing & Connections: Discharge	Suction
	390SI†	0.9	Acrylic / PGC™	Ceramic	Fluorofilm™	PGC™/Polyprel®	4FV	PE .375" O.D.	
	391SI†	0.9	PGC™ / PGC™	Ceramic	Fluorofilm™	PGC™/Polyprel®	4FV	PE .375" O.D.	
	392SI†	0.9	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/Polyprel®	4FV	PE .375" O.D.	
B91 ☒ -	393SI†	0.9	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/PTFE	4FV	PE .375" O.D.	
B92 ☒ -	85 HV	0.9	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
B71 ☒ -	86	0.9	Acrylic / PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
B72 ☒ -	89	0.9	UHMW PE	Ceramic	Hypalon®	Hypalon®		PE .5" O.D.	Vinyl .500" O.D.
B11 ☒ -	91FS	0.9	Acrylic / PVDF	PTFE	Hypalon®	Hypalon®	4FV	PE .375" O.D.	Vinyl .375" O.D.
B12 ☒ -	92S**	0.9	PVC	Ceramic	Fluorofilm™	PTFE	4FV	PE .375" O.D.	
	94S**	0.9	PVC	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
	95S**	0.9	Polypropylene	Ceramic	Fluorofilm™	PTFE	4FV	PE .375" O.D.	
	297	0.9	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
	360SI†	1.8	Acrylic / PGC™	Ceramic	Fluorofilm™	PGC™/Polyprel®	4FV	PE .375" O.D.	
	361SI†	1.8	PGC™ / PGC™	Ceramic	Fluorofilm™	PGC™/Polyprel®	4FV	PE .375" O.D.	
	362SI†	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/Polyprel®	4FV	PE .375" O.D.	
	363SI†	1.8	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/PTFE	4FV	PE .375" O.D.	
B93 ☒ -	71FS	1.8	Acrylic / PVDF	PTFE	Hypalon®	Hypalon®	4FV	PE .5" O.D.	Vinyl .5" O.D.
B73 ☒ -	72S**	1.8	PVC	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	
B13 ☒ -	74S**	1.8	PVC	Ceramic	Fluorofilm™	PTFE	4FV	Pipe 1/4" NPT M	
	75HV	1.8	Polypropylene	316 S.S.	Fluorofilm™	PTFE		PE .5" O.D.	Vinyl .938" O.D.
	75S**	1.8	Polypropylene	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	
	76	1.8	Acrylic / PP	316 S.S.	Fluorofilm™	Hypalon®		PE .5" O.D.	Vinyl .938" O.D.
	79	1.8	UHMW PE	Ceramic	Hypalon®	Hypalon®		PE .5" O.D.	Vinyl .500" O.D.
	277	1.8	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	
	310SI†	3.0	Acrylic / PGC™	Ceramic	Fluorofilm™	PGC™/Polyprel®	4FV	PE .375" O.D.	
	311SI†	3.0	PGC™ / PGC™	Ceramic	Fluorofilm™	PGC™/Polyprel®	4FV	PE .375" O.D.	
B94 ☒ -	312SI†	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/Polyprel®	4FV	PE .375" O.D.	
B74 ☒ -	313SI†	3.0	PVDF / PVDF	Ceramic	Fluorofilm™	PVDF/PTFE	4FV	PE .375" O.D.	
B14 ☒ -	11S**	3.0	Acrylic	Ceramic	Fluorofilm™	Polyprel®	4FV	PE .5" O.D.	Vinyl .5" O.D.
	12S**	3.0	PVC / PVDF	Ceramic	Fluorofilm™	Polyprel®	4FV	PE .5" O.D.	
	15S**	3.0	Polyprel®	Ceramic	Fluorofilm™	PTFE	4FV	PE .5" O.D.	
	217	3.0	316 S.S.	316 S.S.	Fluorofilm™	316 S.S.		Pipe 1/4" NPT M	

☒ See front page for voltage code specifications.

** These Liquid Ends are available without a 4FV.

† To specify ¼" NPT male, change 'I' to 'P'. To specify black, UV resistant tubing, change 'I' to 'U'. To specify Bleed 4FV, change 'S' to 'B'. To specify 3FV, change 'S' to'T'.

3FV Indicates that the pump is equipped with an LMI Three Function Valve (pressure relief, priming aid, line drain).

4FV Indicates that the pump is equipped with an LMI Four Function Valve. This diaphragm type anti-syphon/pressure relief valve is installed on the pump head. It provides anti-syphon protection and aids in priming, even under pressure.

Fluorofilm™ is a copolymer of PTFE and PFA.
Polyprel® is an elastomeric PTFE copolymer.

Polyprel is a registered trademark of Liquid Metronics, Inc.
Fluorofilm, Liquifram, PGC are trademarks of Liquid Metronics, Inc.
Hypalon is a registered trademark of E. I. du Pont de Nemours & Co., Inc.

Output Information

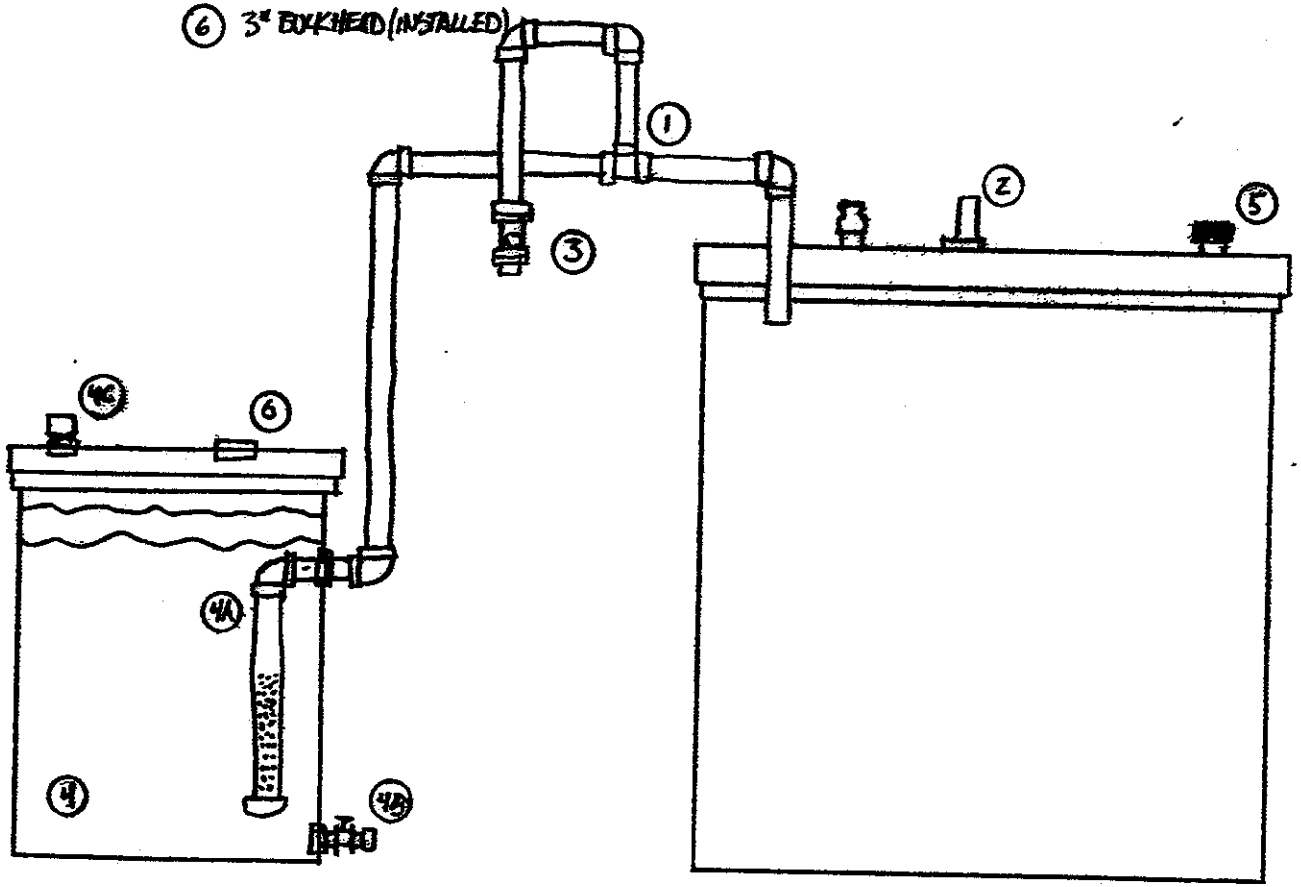
Series	Gallons per Hour* Min	Max	Liters per Hour* Min	Max	mL/cc per Minute* Min	Max	mL/cc per Stroke Min	Max	Maximum Injection Pressure
B11, B71, B91	0.002	1.6	0.006	6.1	0.10	101	0.10	1.01	150 psi (10.30 Bar)
B12, B72, B92	0.003	2.5	0.009	9.5	0.16	158	0.16	1.58	100 psi (6.90 Bar)
B13, B73, B93	0.005	4.5	0.017	17.0	0.28	284	0.28	2.84	50 psi (3.50 Bar)
B14, B74, B94	0.007	7.0	0.027	26.5	0.44	442	0.44	4.42	30 psi (2.07 Bar)

* Minimum output is based on one (1) stroke per minute and 10% stroke setting, minimum output can be reduced further in external mode.
Series B9 pumps may be programmed for strokes per hour for lower outputs.

ITEMS PROVIDED:

1. 2" x 2" x 1" SOC x SOC x SOC TEE, SCH 80 (LOOSE)
2. LIQUID LEVEL GAUGE, 2" MPT (LOOSE)
3. 1" UNION BALL CHECK VALVE (LOOSE)
4. ACID NEUTRALIZATION TANK WITH BULKHEADS FOR ITEMS LISTED BELOW, 55 GALLON, UV RATED, POLYETHYLENE
   - 4A) VERTICAL DIFFUSER W/ 3/8" HOLES EQUALING 200% SURFACE AREA OF PIPE (INSTALLED)
   - 4B) 3/4" DRAIN VALVE (LOOSE)
   - 4C) 2" BANJO VENT (LOOSE)
5. EKO3 VAPORLOC, 2" MPT, TANK SEAL KIT
6. 3" BULKHEAD (INSTALLED)

Qty. 1 Eko3 WS-009-02000
Acid vapor recovery system: includes 55 gallon acid neutralization tank with bulkhead fittings and U-vent; ball valve, hose connector, and acid tank level gauge. Does not include PVC pipe/fittings required for connection



QTY: 1 EKO3 PN: WS-009-02000

Knorr Systems, Inc.
2221 Standard Avenue
Santa Ana, CA 92707
(714) 754-4044

Submittal Approval Page

By Submittal Item

College of San Mateo - CIP2
Project # 006169
1700 W. Hillsdale Blvd.
San Mateo, CA 94402

Tel: 650-638-9370 Fax: 650-638-9377

Preparer Approval	McCarthy Approval
Spec Section **Sub Section** **Item No** **Revision** 13 1107 2.2A, 2.3A-2.3G, 2.4-2.6 786 0 Pool Mechanical **Approved for Submission** By: Michael Leja Western Water Features, Inc.	This review is for general conformance with Plans and Specifications only. Any deviations from same not clearly noted by the Preparer have not been reviewed. Review shall not constitute a complete check of detailed dimensions or count or serve to relieve the Preparer of contractual responsibility for any error or deviation from contract requirements. By: Tom Dixon Date: 05/21/2009 Submittal Package No: 13 0000-0001-0 Swimming Pool Submittal, Western Water Features
LPA, Inc Approval	**Engineer Approval**
1548 Eureka Road Suite 101 Roseville, CA 95661	

PVC Industrial Pipe: Schedule 40

Application:

Corrosion resistant pressure pipe, IPS sizes 1/8" through 24", for use at temperatures up to and including 140° F. Pressure rating (120 psi to 810 psi) varies with schedule, pipe size, and temperature as stated in Harvel Plastics, Inc. engineering bulletin (Product Bulletin 112/401). Pipe is also suitable for PVC plastic drain, waste, and vent (DWV) applications. Generally resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens. Chemical resistance data is available and should be referenced for proper material selection. Pipe exhibits excellent physical properties and flammability characteristics (independently tested flame and smoke characteristics-ULC). Typical applications include: chemical processing, plating, high purity applications, potable water systems, water and wastewater treatment, drainage, irrigation, agricultural, and other applications involving corrosive fluid transfer.

Scope:

This specification outlines minimum manufacturing requirements for Polyvinyl Chloride (PVC) Schedule 40 iron pipe size (IPS) pressure pipe. This pipe is intended for use in applications where the fluid conveyed does not exceed 140° F. This pipe meets and or exceeds the industry standards and requirements as set forth by the American Society for Testing and Materials (ASTM D1785 & D2665) and the National Sanitation Foundation (NSF International STD 61 & Std 14).

PVC Materials:

The material used in the manufacture of the pipe shall be domestically produced rigid polyvinyl chloride (PVC) compound, Type I Grade I, with a Cell Classification of 12454 as defined in ASTM D1784, trade name designation H707 PVC. This compound shall be white or gray in color as specified, and shall be approved by NSF International for use with potable water (NSF Std 61).

Dimensions:

All sizes of PVC Schedule 40 pipe shall be manufactured in strict accordance to the requirements of ASTM D1785 for physical dimensions and tolerances. PVC Sch 40 pipe sizes 1¼" through 24" diameters shall also meet the requirements of ASTM D2665 Standard Specification for PVC plastic drain, waste and vent (DWV) pipe and shall be dual marked as such. Each production run of pipe manufactured in compliance to the standard, shall also meet or exceed the test requirements for materials, workmanship, burst pressure, flattening, and extrusion quality defined in ASTM D1785 and ASTM D2665 as applicable. All belled-end pipe shall have tapered sockets to create an interference-type fit, which meet or exceed the dimensional requirements and the minimum socket length for pressure-type sockets as defined in ASTM D2672. All PVC Schedule 40 pipe must also meet the requirements of NSF Standard 14 and CSA Standard B137.3 rigid PVC pipe for pressure applications, and shall bear the mark of these Listing agencies. This pipe shall have a flame spread rating of 0-25 when tested for surface burning characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent.

Marking:

Product marking shall meet the requirements of ASTM D1785 and ASTM D2665 as applicable and shall include: the manufacturer's name (or the manufacturer's trademark when privately labeled); the nominal pipe size; the material designation code; the pipe schedule and pressure rating in psi for water @ 73° F; the ASTM designation D1785; the ASTM designation D2665 (when dual marked); the independent laboratory's seal of approval for potable water usage; and the date and time of manufacture.

Sample Specification:

All PVC Schedule 40 pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785 and D2665 (where applicable), consistently meeting and/or exceeding the Quality Assurance test requirements of these standards with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall be manufactured in the USA, using domestic materials, by an ISO 9001 certified manufacturer. Standard lengths of pipe sizes 6" and larger shall be beveled each end by the pipe manufacturer. All pipe shall be stored indoors after production at the manufacturing site until shipped from factory. This pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications. All pipe shall be manufactured by HARVEL® PLASTICS, INC.

PVC Industrial Pipe: Schedule 40

Schedule 40 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P.
1/8	0.405	0.249	0.068	0.051	810
1/4	0.540	0.344	0.088	0.086	780
3/8	0.675	0.473	0.091	0.115	620
1/2	0.840	0.602	0.109	0.170	600
3/4	1.050	0.804	0.113	0.226	480
1	1.315	1.029	0.133	0.333	450
* 1-1/4	1.660	1.360	0.140	0.450	370
* 1-1/2	1.900	1.590	0.145	0.537	330
* 2	2.375	2.047	0.154	0.720	280
2-1/2	2.875	2.445	0.203	1.136	300
* 3	3.500	3.042	0.216	1.488	260
3-1/2	4.000	3.521	0.226	1.789	240
* 4	4.500	3.998	0.237	2.118	220
5	5.563	5.016	0.258	2.874	190
* 6	6.625	6.031	0.280	3.733	180
* 8	8.625	7.942	0.322	5.619	160
* 10	10.750	9.976	0.365	7.966	140
* 12	12.750	11.889	0.406	10.534	130
* 14	14.000	13.073	0.437	12.462	130
* 16	16.000	14.940	0.500	16.286	130
* 18	18.000	16.809	0.562	20.587	130
* 20	20.000	18.743	0.593	24.183	120
* 24	24.000	22.544	0.687	33.652	120

* Denotes these sizes are dual marked as being in compliance with both ASTM D1785 (pressure pipe) and ASTM D2665 (drain, waste & vent pipe- DWV).

The pressure ratings given are for water, non-shock, @ 73°F. The following temperature de-rating factors are to be applied to the working pressure ratings (WP) listed when operating at elevated temperatures.

Multiply the working pressure rating of the selected pipe at 73°F by the appropriate de-rating factor to determine the maximum working pressure rating of the pipe at the elevated temperature chosen.

EX:
10" PVC SCH 40 @ 120°F = ?
140 psi x 0.40 = 56 psi max.
@ 120°F

De-Rating Factor

Operating Temp (°F)	De-Rating Factor
73	1.00
80	0.88
90	0.75
100	0.62
110	0.51
120	0.40
130	0.31
140	0.22

THE MAXIMUM SERVICE TEMPERATURE FOR PVC IS 140°F.

Solvent-cemented joints should be utilized when working at or near maximum temperatures. Harvel Plastics does not recommend the use of PVC for threaded connections at temperatures above 110°F; use flanged joints, unions, or roll grooved couplings where disassembly is necessary at elevated temperatures.

Threading of Schedule 40 PVC pipe is not a recommended practice due to insufficient wall thickness. Thread only Schedule 80 or heavier walls. ***Threading requires a 50% reduction in pressure rating stated for plain end pipe @ 73°F.***

Chemical resistance data should be referenced for proper material selection and possible de-rating when working with fluids other than water. Refer to Harvel Plastics 112/401 Product Bulletin for chemical resistance, installation data, and additional information.

ASTM STANDARD D1784 MATERIAL EQUIVALENTS:

Cell Classification 12454 = PVC Type I Grade I = PVC1120

Pipe sizes shown are manufactured in strict compliance with ASTM D1785 and ASTM D2665 where applicable.

PVC Industrial Pipe: Schedule 80

Application:

Corrosion resistant pressure pipe, IPS sizes 1/8" through 24", for use at temperatures up to and including 140° F. Pressure rating (210 psi to 1230 psi) varies with schedule, pipe size, and temperature as stated in Harvel Plastics, Inc. engineering bulletin (Product Bulletin 112/401). Generally resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens. Chemical resistance data is available and should be referenced for proper material selection. Pipe exhibits excellent physical properties and flammability characteristics (independently tested flame and smoke characteristics-ULC). Typical applications include: chemical processing, plating, high purity applications, potable water systems, water and wastewater treatment, irrigation, agricultural, and other industrial applications involving corrosive fluid transfer.

Scope:

This specification outlines minimum manufacturing requirements for Polyvinyl Chloride (PVC) Schedule 80 iron pipe size (IPS) pressure pipe. This pipe is intended for use in applications where the fluid conveyed does not exceed 140° F. This pipe meets and or exceeds the industry standards and requirements as set forth by the American Society for Testing and Materials (ASTM) and the National Sanitation Foundation (NSF International).

PVC Materials:

The material used in the manufacture of the pipe shall be domestically produced rigid polyvinyl chloride (PVC) compound, Type I Grade I, with a Cell Classification of 12454 as defined in ASTM D1784, trade name designation H707 PVC. This compound shall be gray in color as specified, and shall be approved by NSF International for use with potable water (NSF Std 61).

Dimensions:

PVC Schedule 80 pipe shall be manufactured in strict accordance to the requirements of ASTM D1785 for physical dimensions and tolerances. Each production run of pipe manufactured in compliance to this standard, shall also meet or exceed the test requirements for materials, workmanship, burst pressure, flattening, and extrusion quality defined in ASTM D1785. All belled-end pipe shall have tapered sockets to create an interference-type fit, which meet or exceed the dimensional requirements and the minimum socket length for pressure-type sockets as defined in ASTM D2672. All PVC Schedule 80 pipe must also meet the requirements of NSF Standard 14 and CSA Standard B137.3 rigid PVC pipe for pressure applications, and shall bear the mark of these Listing agencies. This pipe shall have a flame spread rating of 0-25 when tested for surface burning characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent.

Marking:

Product marking shall meet the requirements of ASTM D1785 and shall include: the manufacturer's name (or the manufacturer's trademark when privately labeled); the nominal pipe size; the material designation code; the pipe schedule and pressure rating in psi for water @ 73° F; the ASTM designation D1785; the independent laboratory's seal of approval for potable water usage; and the date and time of manufacture.

Sample Specification:

All PVC Schedule 80 pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785, consistently meeting and/or exceeding the Quality Assurance test requirements of this standard with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall be manufactured in the USA, using domestic materials, by an ISO 9001 certified manufacturer. Standard lengths of pipe sizes 6" and larger shall be beveled each end by the pipe manufacturer. All pipe shall be stored indoors after production at the manufacturing site until shipped from factory. This pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications. All pipe shall be manufactured by HARVEL PLASTICS, INC.

PVC Industrial Pipe: Schedule 80

Schedule 80 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P.
1/8	0.405	0.195	0.095	0.063	1230
1/4	0.540	0.282	0.119	0.105	1130
3/8	0.675	0.403	0.126	0.146	920
1/2	0.840	0.526	0.147	0.213	850
3/4	1.050	0.722	0.154	0.289	690
1	1.315	0.936	0.179	0.424	630
1-1/4	1.660	1.255	0.191	0.586	520
1-1/2	1.900	1.476	0.200	0.711	470
2	2.375	1.913	0.218	0.984	400
2-1/2	2.875	2.290	0.276	1.500	420
3	3.500	2.864	0.300	2.010	370
3-1/2	4.000	3.326	0.318	2.452	350
4	4.500	3.786	0.337	2.938	320
5	5.563	4.768	0.375	4.078	290
6	6.625	5.709	0.432	5.610	280
8	8.625	7.565	0.500	8.522	250
10	10.750	9.493	0.593	12.635	230
12	12.750	11.294	0.687	17.384	230
14	14.000	12.410	0.750	20.852	220
16	16.000	14.213	0.843	26.810	220
18	18.000	16.014	0.937	33.544	220
20	20.000	17.814	1.031	41.047	220
24	24.000	21.418	1.218	58.233	210

The pressure ratings given are for water, non-shock, @ 73° F. The following temperature de-rating factors are to be applied to the working pressure ratings (WP) listed when operating at elevated temperatures.

Multiply the working pressure rating of the selected pipe at 73° F, by the appropriate de-rating factor to determine the maximum working pressure rating of the pipe at the elevated temperature chosen.

EX:
10" PVC SCH 80 @ 120° F = ?
230 psi x 0.40 = 92 psi max. @ 120° F

De-Rating Factor

Operating Temp (°F)	De-Rating Factor
73	1.00
80	0.88
90	0.75
100	0.62
110	0.51
120	0.40
130	0.31
140	0.22

THE MAXIMUM SERVICE TEMPERATURE FOR PVC IS 140° F.

Solvent-cemented joints should be utilized when working at or near maximum temperatures. Harvel Plastics does not recommend the use of PVC for threaded connections at temperatures above 110° F; use flanged joints, unions, or roll grooved couplings where disassembly is necessary at elevated temperatures.

Thread only Schedule 80 or heavier walls. ***Threading requires a 50% reduction in pressure rating stated for plain end pipe @73° F.*** Threading of Schedule 40 PVC pipe is not a recommended practice due to insufficient wall thickness.

Chemical resistance data should be referenced for proper material selection and possible de-rating when working with fluids other than water. Refer to Harvel Plastics 112/401 Product Bulletin for chemical resistance, installation data, and additional information.

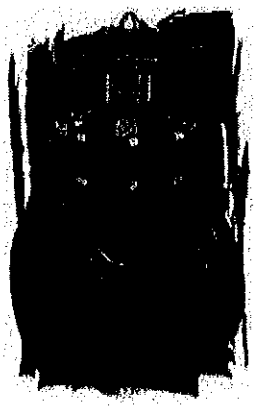
ASTM STANDARD D1784 MATERIAL EQUIVALENTS:

Cell Classification 12454 = PVC Type I Grade 1 = PVC1120

Pipe sizes shown are manufactured in strict compliance with ASTM D1785.

GATE VALVE

Asahi Gate Valves Flanged



- Polypropylene or optional CPVC -lined (SBR) styrene butadiene rubber elastomeric plug provides bubble-tight seal.
- Position indicator.
- Eliminates chatter.
- Sizes: 1-1/2"- 14" with polypropylene plug.
- Models: flanged (ANSI).
- Bodies: PVC.
- Seals: EPDM or Viton.
- Options: electric actuator, stem extensions, 2" square or T-handle operating nuts, and chain wheel operators. Other gate and seal materials available.

Size	Part Number
1-1/2	1251015
2	1251020
3	1251030
4	1251040
5	1251050
6	1251060
8	1251080
10	1251100
12	1251120
14	1251140

General Valve Statement

Harrington Industrial Plastics, Inc. is proud to represent and stock the major brands of true union ball valves in all industrial thermoplastics. Unique manufacturers' innovations give you the opportunity to tailor the right valve to fit your system. For valves other than those shown in this section, contact your local Harrington service center.

Part numbers indicate polypropylene plug and EPDM seals.

124
124

Pool-Pro® Type SP Butterfly Valve

Specifications

Sizes:	1-1/2" – 12"
Models:	Wafer Style
Operators:	Lever and Gear
Bodies:	PVC
Discs:	PVC
Seats:	EPDM
Seals:	EPDM
Stems:	316 stainless steel

Standard Features (Sizes 1-1/2" – 12")

- **Submersible**

Material of construction allows complete submersion of valve body as all components are compatible with Chlorinated water.

- **PVC/PVC/EPDM Construction**

Ideal for Chlorinated water applications.

- **Blue Handle Design**

Blue handle designates the proper valve is in place for Chlorinated water applications.

- **316SS Non-wetted Stem**

Stem does not come in contact with the media but is still compatible if in direct contact.

- **Thermoplastic Material**

Lightweight construction allows for easy installation.

- **ISO Mounting Pad**

Allows for field mounting of accessories including stem extensions, gear operators & automation.

Sample Specifications

All "Pool-Pro" Type SP Butterfly Valves sizes 1 1/2"-12" shall be of a PVC, Body,PVC Disc and EPDM construction suitable for Chlorinated water applications. Stem shall be of 316 stainless steel and non-wetted.Valves shall be a self-gasketing design with a convex sealing arrangement. All "Pool-Pro" Type SP (1 1/2"-10") valves shall be rated to 150 psi and size (12") 100 psi at 70 degrees F as manufactured by Asahi/America, Inc.

Parts List (Sizes 1 1/2" - 12")

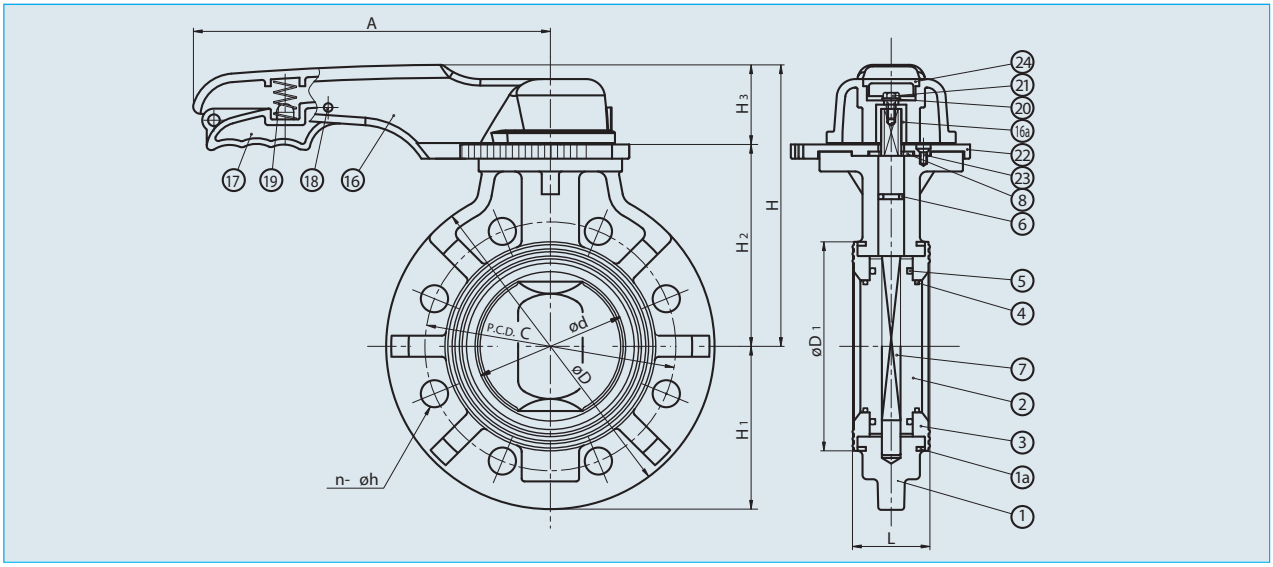
PARTS			
NO.	DESCRIPTION	PCS.	MATERIAL
1	Body	1	PVC
2	Disc	1	PVC
3	Seat	1	EPDM
4	O-Ring (A)	2	EPDM
5	O-Ring (B)	2	EPDM
6	O-Ring (C)	1	EPDM
7	Stem	1	Stainless Steel 316
8	Stem Holder	1	Stainless Steel 304
16	Handle	1	PP
16a	Metal Insert in Handle	1	Stainless Steel 316L
17	Handle Lever	1	PPG
18	Pin	1	PPG
19	Spring	1	Stainless Steel 304
20	Washer (A)	1	Stainless Steel 304
21	Bolt (B)	1	Stainless Steel 304
22	Locking Plate	1	PPG
23	Screw (B)	4	Stainless Steel 304
24	Cap (A)	1	PP
25	Gear Box	1	Plasgear ™
28	Bolt (C)	4	Stainless Steel 304

Dimensions

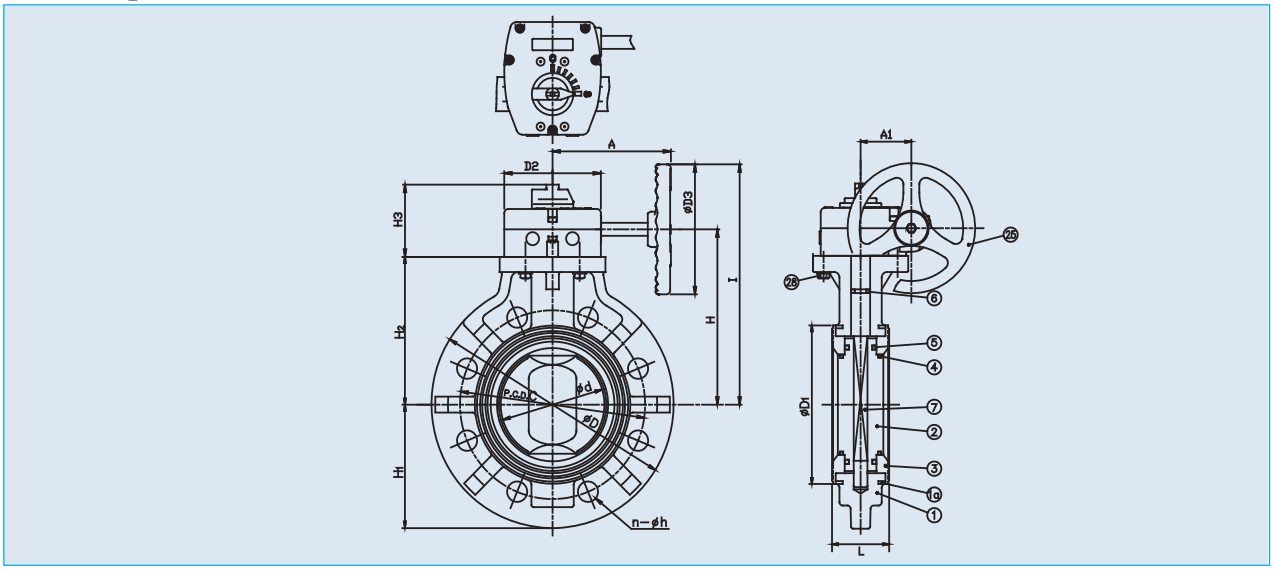
NOMINAL SIZE			ANSI CLASS 150														
INCHES	mm	d	C	n	h	D	D1	D2	D3	L	H	H1	H2	H3	I	A	A1
1 1/2	40	1.85	3.88	4	0.62	5.91	3.23	4.80	6.30	1.54	5.12	2.95	3.74	3.74	8.27	6.57	2.52
2	50	2.24	4.75	4	0.75	6.50	3.43	4.80	6.30	1.65	5.36	3.27	3.98	3.74	8.51	6.57	2.52
2 1/2	65	2.80	5.50	4	0.75	7.28	4.41	4.80	6.30	1.81	5.79	3.66	4.41	3.74	8.94	6.57	2.52
3	80	3.15	6.00	4	0.75	7.87	4.84	4.80	6.30	1.81	6.07	3.94	4.69	3.74	9.22	6.57	2.52
4	100	4.13	7.50	8	0.75	9.02	5.79	4.80	6.30	2.20	6.77	4.53	5.39	3.74	9.92	6.57	2.52
5	125	5.16	8.50	8	0.88	10.00	7.09	4.80	6.30	2.60	7.84	5.00	6.46	3.74	10.99	6.57	2.52
6	150	6.06	9.50	8	0.88	11.22	8.27	4.80	6.30	2.80	8.35	5.63	6.97	3.74	11.50	6.57	2.52
8	200	8.03	11.75	8	0.88	13.39	10.12	4.80	6.30	3.43	9.61	6.69	8.23	3.74	12.76	6.57	2.52
10	250	10.08	14.25	12	1.00	15.98	12.44	4.80	6.30	4.33	10.87	7.99	9.49	3.74	14.02	6.57	2.52
12	300	12.60	17.00	12	1.00	19.02	14.57	7.40	11.81	5.08	13.39	9.53	11.73	4.25	19.29	9.53	3.90

Pool-Pro Type SP Butterfly Valve

Lever Style



Gear Style



Pressue vs Temperature

NOMINAL SIZE		30 °F 120 °F
INCHES	mm	
11/2	40	150 PSI
2	50	150 PSI
21/2	65	150 PSI
3	80	150 PSI
4	100	150 PSI
6	150	150 PSI
8	200	150 PSI
10	250	150 PSI
12	300	100 PSI

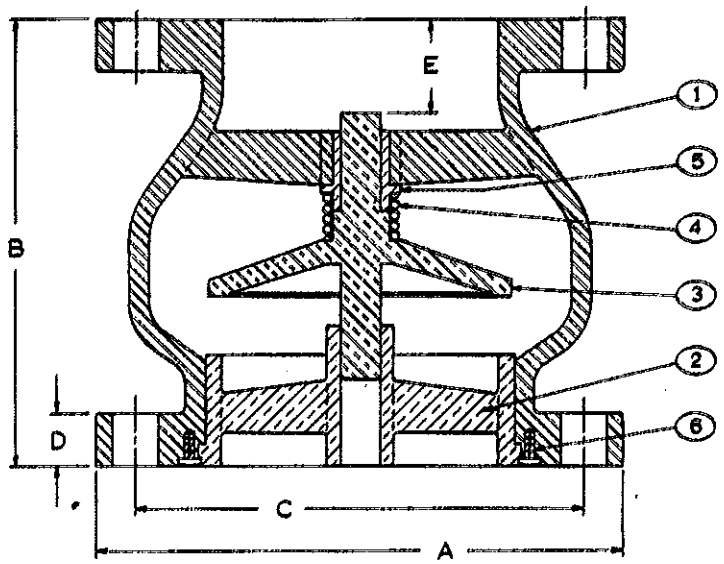
Weight (lbs)

NOMINAL SIZE		Lever/Gear Operated (lbs)
INCHES	mm	
11/2 (L)	40	2.7
2 (L)	50	3.1
21/2 (L)	65	3.5
3 (L)	80	4.0
4 (L)	100	5.5
6 (L)	150	13.3
8 (L)	200	19.9
8 (G)	200	24.3
10 (G)	250	41.0
12 (G)	300	58.4

CV Values

NOMINAL SIZE		Cv (at various opening degrees)		
INCHES	mm	30°	60°	90°
11/2	40	2.9	43.3	71
2	50	3.9	56.1	92
21/2	65	5.9	85.4	140
3	80	9.3	134	220
4	100	15.1	231	380
6	150	46.6	671	1100
8	200	106	1425	2500
10	250	270	1476	3600
12	300	408	2140	5160

NOTE: THESE VALVES MATE TO WAFER-STYLE BUTTERFLY VALVES WITHOUT THE USE OF SPOOL PIECES OR OTHER ADAPTORS.



STYLE 900
GLOBE STYLE
SILENT CHECK VALVE
2.5" through 10"

NOTE:
Valve is designed for liquid service only, install 3 to 4 pipe diameters downstream from pump discharge or elbows to avoid flow turbulence. Valve is designed to be mated to standard steel flanges.

PART NO. / NAME	MATERIAL / ASTM NO.
1 BODY	Cast Iron ASTM A48
2 SEAT	Bronze ASTM B584
3 PLUG	Bronze ASTM B584
4 SPRING	Stainless Steel T304
5 BUSHING	Bronze ASTM B584
6 SCREWS	Stainless Steel T304

OTHER MATERIALS AND RESILIENT SEATS ARE AVAILABLE - CONTACT FACTORY

MAX. NON-SHOCK WORKING PSI 125# ANSI B16.1 FLANGE RATING		
	TEMPERATURE	
SIZE	150°F.	200°F.
2-1/2"- 10"	200 PSI	190 PSI

MAX. NON-SHOCK WORKING PSI 250# ANSI B16.1 FLANGE RATING		
	TEMPERATURE	
SIZE	150°F.	200°F.
2-1/2" - 10"	400 PSI	370 PSI

2-1/2" VALVE - TRIM IS THREADED INTO BODY

QTY.	VALVE SIZE	MODEL NUMBER	A	B	C	D	E	C_V*	BOLT SIZE	NO. OF BOLTS
ANSI CLASS 125										
	2-1/2"	902.5	5-1/2"	7"	5-1/2"	11/16"	1-3/16"	110	5/8"	4
	3	903	7-1/2	6	6	15/16	1-3/8	155	5/8	4
	4	904	9	7-1/4	7-1/2	15/16	1-3/4	278	5/8	8
	5	905	10	8-1/2	8-1/2	15/16	2	435	3/4	8
	6	906	11	9-3/4	9-1/2	1	2-1/2	625	3/4	8
	8	908	13-1/2	12-1/2	11-3/4	1-1/8	3-1/4	1115	3/4	8
	10	910	16	15-1/2	14-1/4	1-3/16	4-1/4	1770	7/8	12
ANSI CLASS 250										
	2-1/2"	952.5	5-1/2"	7-1/2"	5-7/8"	1"	1-7/16"	110	3/4"	8
	3	953	8-1/4	6	6-5/8	1-1/8	1-3/8	155	3/4	8
	4	954	10	7-1/4	7-7/8	1-1/4	1-3/4	278	3/4	8
	5	955	11	8-1/2	9-1/4	1-3/8	2	435	3/4	8
	6	956	12-1/2	9-3/4	10-5/8	1-7/16	2-1/2	625	3/4	12
	8	958	15	12-1/2	13	1-5/8	3-1/4	1115	7/8	12
	10	950	17-1/2	15-1/2	15-1/4	1-7/8	4-1/4	1770	1	16

*Flow coefficient is the number of U.S. gallons/minute of 60°F water that will flow through a valve with 1 PSI of pressure drop across the valve.

CUSTOMER _____

PROJECT _____

ENGINEER _____

ARCHITECT _____

PRO OR P.O. NO. _____

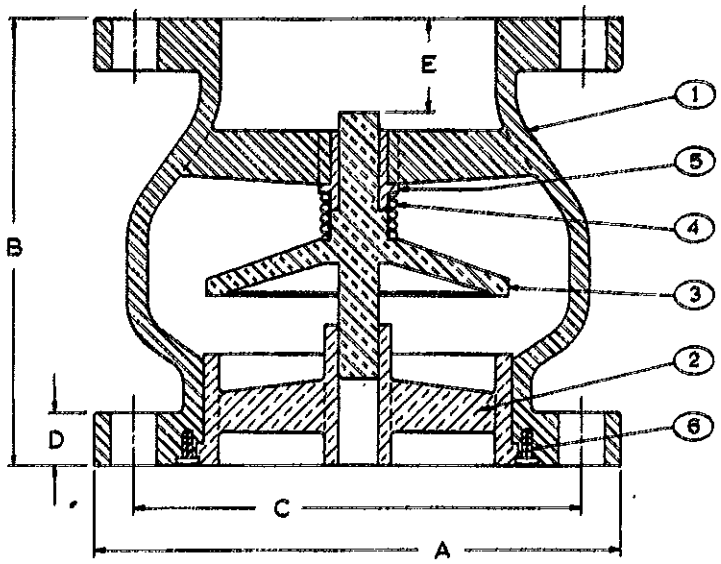
the Metraflex company
CHICAGO ILLINOIS

DESCRIPTION:
2-1/2" - 10" 125# and 250# GLOBE STYLE SILENT CHECK VALVE

DRAWN BY :	DATE:	DRAWING NO:
JRR	REV 1/1/03	900-2.5

127

NOTE: THESE VALVES MATE TO WAFER-STYLE BUTTERFLY VALVES WITHOUT THE USE OF SPOOL PIECES OR OTHER ADAPTORS.



STYLE 900
GLOBE STYLE
SILENT CHECK VALVE
2.5" through 10"

NOTE:
Valve is designed for liquid service only, install 3 to 4 pipe diameters downstream from pump discharge or elbows to avoid flow turbulence. Valve is designed to be mated to standard steel flanges.

PART NO. / NAME	MATERIAL / ASTM NO.
1 BODY	Cast Iron ASTM A48
2 SEAT	Bronze ASTM B584
3 PLUG	Bronze ASTM B584
4 SPRING	Stainless Steel T304
5 BUSHING	Bronze ASTM B584
6 SCREWS	Stainless Steel T304

OTHER MATERIALS AND RESILIENT SEATS ARE AVAILABLE - CONTACT FACTORY

MAX. NON-SHOCK WORKING PSI 125# ANSI B16.1 FLANGE RATING		
	TEMPERATURE	
SIZE	150°F.	200°F.
2-1/2"- 10"	200 PSI	190 PSI

MAX. NON-SHOCK WORKING PSI 250# ANSI B16.1 FLANGE RATING		
	TEMPERATURE	
SIZE	150°F.	200°F.
2-1/2" - 10"	400 PSI	370 PSI

2-1/2" VALVE - TRIM IS THREADED INTO BODY

ANSI CLASS 125

QTY.	VALVE SIZE	MODEL NUMBER	A	B	C	D	E	C_V*	BOLT SIZE	NO. OF BOLTS
	2-1/2"	902.5	5-1/2"	7"	5-1/2"	11/16"	1-3/16"	110	5/8"	4
	3	903	7-1/2	6	6	15/16	1-3/8	155	5/8	4
	4	904	9	7-1/4	7-1/2	15/16	1-3/4	278	5/8	8
	5	905	10	8-1/2	8-1/2	15/16	2	435	3/4	8
	6	906	11	9-3/4	9-1/2	1	2-1/2	625	3/4	8
	8	908	13-1/2	12-1/2	11-3/4	1-1/8	3-1/4	1115	3/4	8
	10	910	16	15-1/2	14-1/4	1-3/16	4-1/4	1770	7/8	12

ANSI CLASS 250

	2-1/2"	952.6	5-1/2"	7-1/2"	5-7/8"	1"	1-7/16"	110	3/4"	8
	3	953	8-1/4	6	6-5/8	1-1/8	1-3/8	155	3/4	8
	4	954	10	7-1/4	7-7/8	1-1/4	1-3/4	278	3/4	8
	5	955	11	8-1/2	9-1/4	1-3/8	2	435	3/4	8
	6	956	12-1/2	9-3/4	10-5/8	1-7/16	2-1/2	625	3/4	12
	8	958	15	12-1/2	13	1-5/8	3-1/4	1115	7/8	12
	10	950	17-1/2	15-1/2	15-1/4	1-7/8	4-1/4	1770	1	16

*Flow coefficient is the number of U.S. gallons/minute of 60°F water that will flow through a valve with 1 PSI of pressure drop across the valve.

CUSTOMER _____

PROJECT _____

ENGINEER _____

ARCHITECT _____

PRO OR P.O. NO. _____

the Metraflex company
CHICAGO ILLINOIS

DESCRIPTION:
2-1/2" - 10" 125# and 250# GLOBE STYLE SILENT CHECK VALVE

DRAWN BY :	DATE:	DRAWING NO:
JRR	REV 1/1/03	900-2.5

128

Qty. 1 EPD #2-0020-240
Modulating float valve for horizontal installation (12")

MODULATING FLOAT VA
FOR HORIZONTAL INSTALLATION

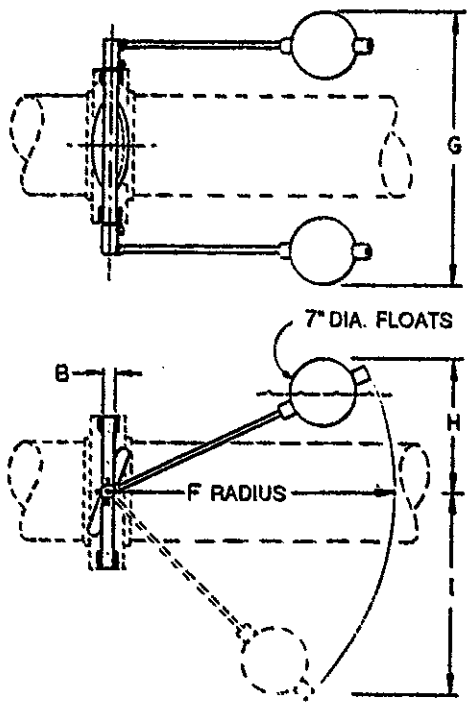
The Modulating Float Valve assembly shall be designed for mounting between two companion flanges in a horizontal position. The valve shall be 80 % closed when the float assemblies are up and full open when the float assemblies are down.

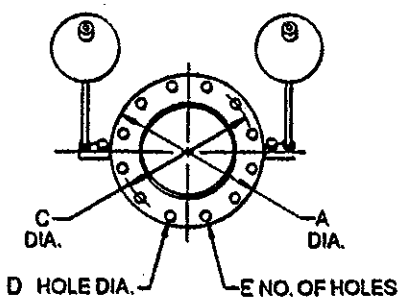
The valve body and disc shall be made from stress relieved Polypropylene series 500. The disc shall be mounted to the valve body by a single .625" diameter stainless steel shaft. The valve shaft shall be fitted with o-rings to promote ease of operation and reduce leakage to atmosphere during low water conditions.

Two 7" diameter polyethylene floats, attached to .50" diameter stainless steel float rods, shall activate the modulating valve. All attaching hardware, clevis assemblies, float retainers, spring pins, nuts and bolts shall all be stainless steel. Two Neoprene gaskets shall be supplied to complete the assembly.

Valve shall fit between two standard 12" I.P.S. pipe flanges.

Modulating float valve assembly shall be EPD number 2-0020-240.





CATALOG NUMBER	SIZE I.P.S.	A	B	C	D	E	F	G	H	I
2-0020-016	4"	9"	1"	7 1/2"	3/4"	8	30"	21 1/8"	14"	22"
2-0020-017	6"	11"	1"	9 1/2"	7/8"	8	30"	23 1/8"	14"	22"
2-0020-018	8"	13 1/2"	1 1/4"	11 3/4"	7/8"	8	30"	25 1/8"	14"	22"
2-0020-019	10"	16"	1 1/4"	14 1/4"	1"	12	30"	28 1/8"	14"	22"
2-0020-240	12"	19"	1 1/4"	17"	1"	12	30"	31 1/8"	14"	22"
2-0020-074	14"	21"	1 1/2"	18 3/4"	1 1/8"	12	30"	33 1/2"	14"	22"

ENVIRONMENTAL PRODUCTS DIVISION
Industrial-Commercial Filtration

MODULATING FLOAT VALVE FOR HORIZONTAL INSTALLATION

DATE	DRAWING NUMBER
January 1, 1994	A-02

DB1293-036

Knorr Systems, Inc.
2221 Standard Avenue
Santa Ana, CA 92707
714-754-4044

MODULATING FLOAT VALVE
FOR HORIZONTAL INSTALLATION

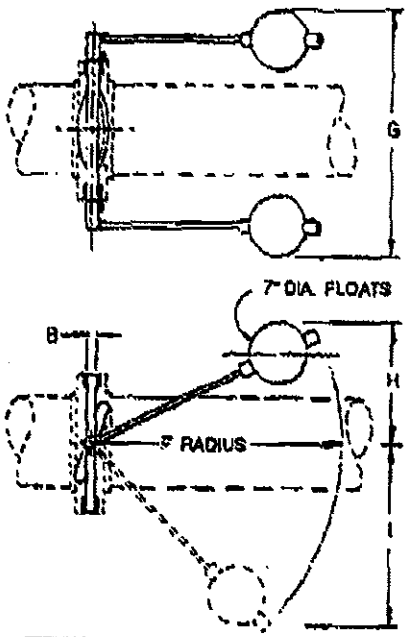
The Modulating Float Valve assembly shall be designed for mounting between two companion flanges in a horizontal position. The valve shall be 80 % closed when the float assemblies are up and full open when the float assemblies are down.

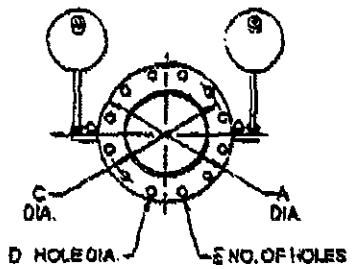
The valve body and disc shall be made from stress relieved Polypropylene series 500. The disc shall be mounted to the valve body by a single .625" diameter stainless steel shaft. The valve shaft shall be fitted with o-rings to promote ease of operation and reduce leakage to atmosphere during low water conditions.

Two 7" diameter polyethylene floats, attached to .50" diameter stainless steel float rods, shall activate the modulating valve. All attaching hardware, clevis assemblies, float retainers, spring pins, nuts and bolts shall all be stainless steel. Two Neoprene gaskets shall be supplied to complete the assembly.

Valve shall fit between two standard _____ I.P.S. pipe flanges.

Modulating float valve assembly shall be EPD number _____.





CATALOG NUMBER	SIZE I.P.S.	A	B	C	D	E	F	G	H	I
2-0020-016	4"	9"	1"	7 1/2"	3/4"	8	30°	21 1/8"	14"	22"
2-0020-017	6"	11"	1"	9 1/2"	7/8"	8	30°	23 1/8"	14"	22"
2-0020-018	8"	13 1/2"	1 1/4"	11 3/4"	7/8"	8	30°	25 1/8"	14"	22"
2-0020-019	10"	16"	1 1/4"	14 1/4"	1"	12	30°	28 1/8"	14"	22"
2-0020-044	12"	19"	1 1/4"	17"	1"	12	30°	31 1/8"	14"	22"
2-0020-074	14"	21"	1 1/2"	18 3/4"	1 1/8"	12	30°	33 1/2"	14"	22"

ENVIRONMENTAL PRODUCTS DIVISION
Industrial-Commercial Filtration

MODULATING FLOAT VALVE
FOR HORIZONTAL INSTALLATION

DATE	DRAWING NUMBER
January 1, 1994	A-02

DB1293-036

Knorr Systems, Inc.
2221 Standard Avenue
Santa Ana, CA 92707
(714) 754-4044

Pool-Pro® Type SP Butterfly Valve

Specifications

Sizes:	1-1/2" – 12"
Models:	Wafer Style
Operators:	Lever and Gear
Bodies:	PVC
Discs:	PVC
Seats:	EPDM
Seals:	EPDM
Stems:	316 stainless steel

Standard Features (Sizes 1-1/2" – 12")

- **Submersible**

Material of construction allows complete submersion of valve body as all components are compatible with Chlorinated water.

- **PVC/PVC/EPDM Construction**

Ideal for Chlorinated water applications.

- **Blue Handle Design**

Blue handle designates the proper valve is in place for Chlorinated water applications.

- **316SS Non-wetted Stem**

Stem does not come in contact with the media but is still compatible if in direct contact.

- **Thermoplastic Material**

Lightweight construction allows for easy installation.

- **ISO Mounting Pad**

Allows for field mounting of accessories including stem extensions, gear operators & automation.

Sample Specifications

All "Pool-Pro" Type SP Butterfly Valves sizes 1 1/2"-12" shall be of a PVC, Body,PVC Disc and EPDM construction suitable for Chlorinated water applications. Stem shall be of 316 stainless steel and non-wetted.Valves shall be a self-gasketing design with a convex sealing arrangement. All "Pool-Pro" Type SP (1 1/2"-10") valves shall be rated to 150 psi and size (12") 100 psi at 70 degrees F as manufactured by Asahi/America, Inc.

Parts List (Sizes 1 1/2" - 12")

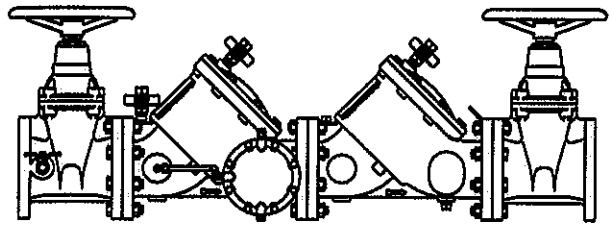
PARTS			
NO.	DESCRIPTION	PCS.	MATERIAL
1	Body	1	PVC
2	Disc	1	PVC
3	Seat	1	EPDM
4	O-Ring (A)	2	EPDM
5	O-Ring (B)	2	EPDM
6	O-Ring (C)	1	EPDM
7	Stem	1	Stainless Steel 316
8	Stem Holder	1	Stainless Steel 304
16	Handle	1	PP
16a	Metal Insert in Handle	1	Stainless Steel 316L
17	Handle Lever	1	PPG
18	Pin	1	PPG
19	Spring	1	Stainless Steel 304
20	Washer (A)	1	Stainless Steel 304
21	Bolt (B)	1	Stainless Steel 304
22	Locking Plate	1	PPG
23	Screw (B)	4	Stainless Steel 304
24	Cap (A)	1	PP
25	Gear Box	1	Plasgear ™
28	Bolt (C)	4	Stainless Steel 304

Dimensions

NOMINAL SIZE			ANSI CLASS 150														
INCHES	mm	d	C	n	h	D	D1	D2	D3	L	H	H1	H2	H3	I	A	A1
1 1/2	40	1.85	3.88	4	0.62	5.91	3.23	4.80	6.30	1.54	5.12	2.95	3.74	3.74	8.27	6.57	2.52
2	50	2.24	4.75	4	0.75	6.50	3.43	4.80	6.30	1.65	5.36	3.27	3.98	3.74	8.51	6.57	2.52
2 1/2	65	2.80	5.50	4	0.75	7.28	4.41	4.80	6.30	1.81	5.79	3.66	4.41	3.74	8.94	6.57	2.52
3	80	3.15	6.00	4	0.75	7.87	4.84	4.80	6.30	1.81	6.07	3.94	4.69	3.74	9.22	6.57	2.52
4	100	4.13	7.50	8	0.75	9.02	5.79	4.80	6.30	2.20	6.77	4.53	5.39	3.74	9.92	6.57	2.52
5	125	5.16	8.50	8	0.88	10.00	7.09	4.80	6.30	2.60	7.84	5.00	6.46	3.74	10.99	6.57	2.52
6	150	6.06	9.50	8	0.88	11.22	8.27	4.80	6.30	2.80	8.35	5.63	6.97	3.74	11.50	6.57	2.52
8	200	8.03	11.75	8	0.88	13.39	10.12	4.80	6.30	3.43	9.61	6.69	8.23	3.74	12.76	6.57	2.52
10	250	10.08	14.25	12	1.00	15.98	12.44	4.80	6.30	4.33	10.87	7.99	9.49	3.74	14.02	6.57	2.52
12	300	12.60	17.00	12	1.00	19.02	14.57	7.40	11.81	5.08	13.39	9.53	11.73	4.25	19.29	9.53	3.90

FEBCO®
BACKFLOW PREVENTION

Reduced Pressure Assembly



FEBCO MODEL 825YD (2-1/2" - 10")

Features

- The ***DuraCheck*** features all stainless steel check assemblies for corrosion resistance, reduced fouling and longer valve life.
- ***DuraCast*** ductile iron body for superior strength, corrosion resistance and lighter weight.
- Ultimate mechanical protection of potable water against hazards of cross connection contamination.
- Meets all specifications of AWWA, ASSE, the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California, and UL classified for fire sprinkler service.
- Documented flow curves established by University of Southern California Foundation for Cross Connection Control and Hydraulic Research.
- All bronze modular relief valve for ease of maintenance.

Operation

In a flow condition the check valves are open with the pressure between the checks, called the zone, being maintained at least 5.0 PSI lower than the inlet pressure and the relief valve is maintained closed.

Should abnormal conditions arise under no flow or reversal of flow, the differential relief valve will open and discharge to maintain the zone at least 2 PSI lower than the supply. In resumption of normal flow, the zone's differential pressure will resume and the relief valve will close.

Typical Applications

RP assemblies used to protect against high hazard (toxic) fluids in water services to industrial plants, hospitals, morgues, mortuaries, and chemical plants. They are also used in irrigation systems, boilerfeed, water lines and other installations requiring maximum protection.

Specification

Reduced pressure backflow preventer assemblies shall consist of two independent "Y" configured check valves and one differential relief valve.

By design, the assembly shall automatically reduce the pressure in the zone between the check valves. Should the differential between the zone and upstream pressure drop to 2 PSI, the differential relief valve will open, maintaining proper zone differential.

Valve bodies and cover shall be manufactured of ductile iron ASTM A536, Grade 65-45 12, Ductile iron bodies shall be flanged, ANSI B16.1, Class 125, epoxy coated.

The assembly shall be constructed so all internal parts, including seat rings, can be serviced from the top or side or removed while assembly is in line, The assembly shall be rated 175 MWWP (32°-14°F).

Relief valve assembly shall be of a modular design for ease of maintenance.

The assembly shall meet or exceed requirements of ASSE standard 1013, AWWA standard C511-89, and the USC Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California.

Reduced pressure backflow preventer assemblies shall be FEBCO 825YD, or prior approved equal.

Agency Compliance

Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.*

ASSE Listed (Std. 1013)

ANSI/AWWA Conformance (C511-89)

CAN/CSA Certified (B64.4)

ULC Listed (2-1/2", 3", 6"-10")

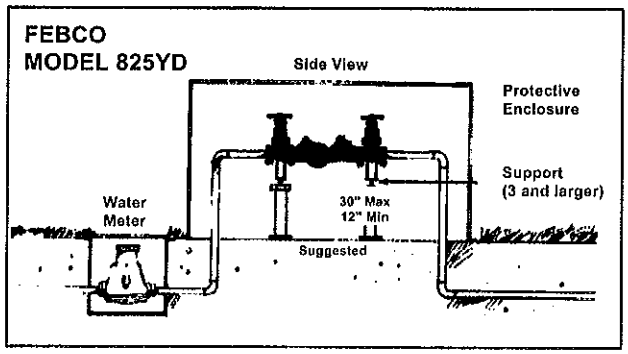
UL Listed•

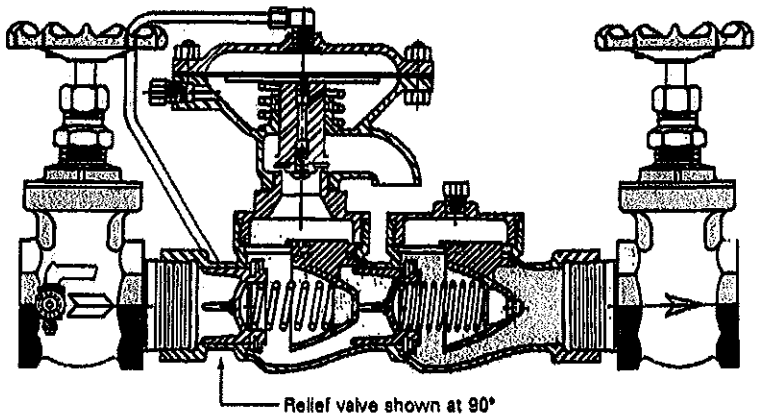
FM Approved•

* Valves must be supplied with resilient seated shut-off valves for USC approvals to be in effect. Standard Meter is GPM.
• UL and FM Listings only applicable with approved OS&Y gates.

Installation

Reduced Pressure Backflow Preventers should be installed with a suggested minimum clearance of 12" between port and floor or grade. They must be installed where any discharge will not be objectionable and can be positively drained away. They should be installed where easily accessible for testing and maintenance and must be protected from freezing. Larger sizes should have support blocks to prevent flange damage. Thermal water expansion and/or water hammer down stream of the Backflow Preventer can cause excessive pressure. Excessive pressure situations should be eliminated to avoid possible damage to the system and assembly.

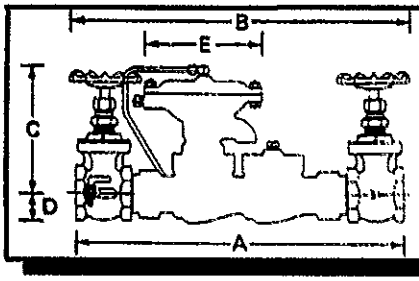




FEBCO® BACKFLOW PREVENTION

Model 835 (3/4" - 2") Reduced Pressure Backflow Preventer

DIMENSIONS & WEIGHTS



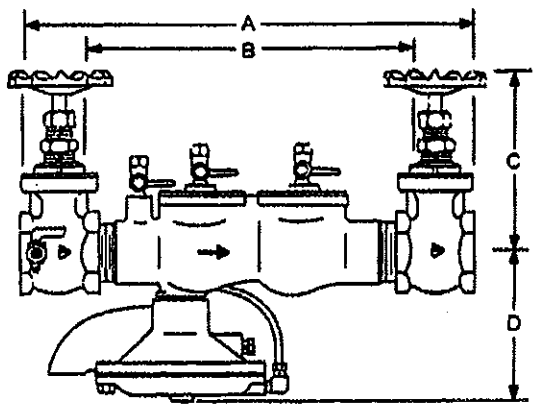
Size	A	B	C	D	E	Weight
3/4"	12 3/4"	13"	6"	7/8"	4 5/8"	17
1"	12 3/4"	13"	6"	7/8"	4 5/8"	17
1 1/2"	18"	18 1/2"	7 7/8"	1 7/8"	6 3/4"	34
2"	18 7/8"	19 3/4"	7 7/8"	1 7/8"	6 3/4"	37

Febco model 835(B) backflow preventers use two spring loaded check valves for maximum flow and dependable service, and one differential pressure relief valve. Each of these valves can be disassembled and repaired without being removed from the line.

9 Febco

FEBCO® BACKFLOW PREVENTION

Model 835B (3/4" - 2") Reduced Pressure Backflow Preventer

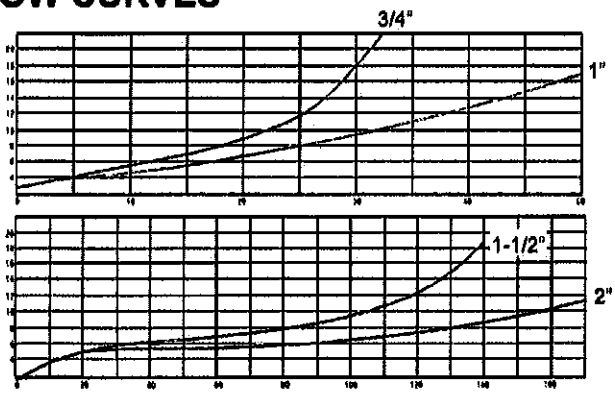


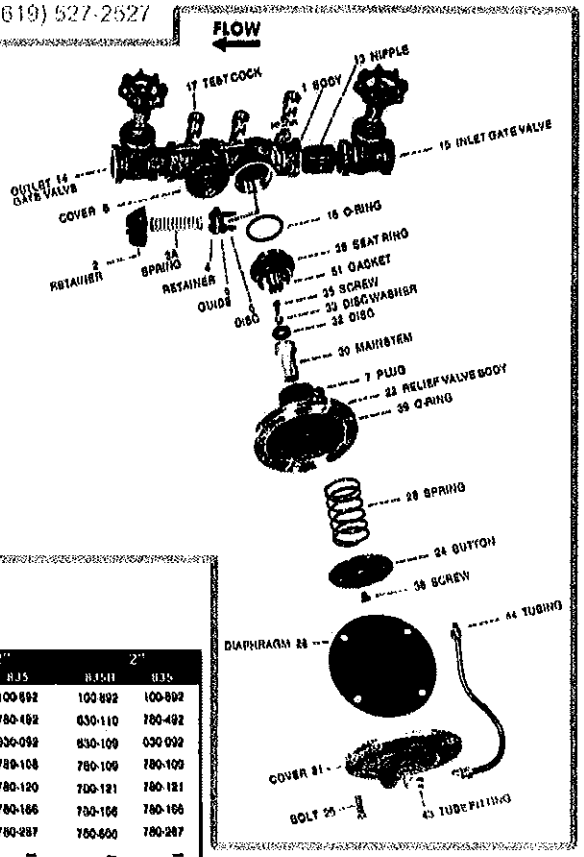
DIMENSIONS & WEIGHTS

Size	A	B	C	D	E	Weight
¾	10	7⅛	4¼	4½	2⅜	9½
1	11¼	7⅛	5⅜	4½	2⅜	10½
1½	15¾	12¼	7⅛	6⅛	3⅜	26½
2	16¼	12¼	8½	6⅛	3⅜	29

MODEL 835

FLOW CURVES



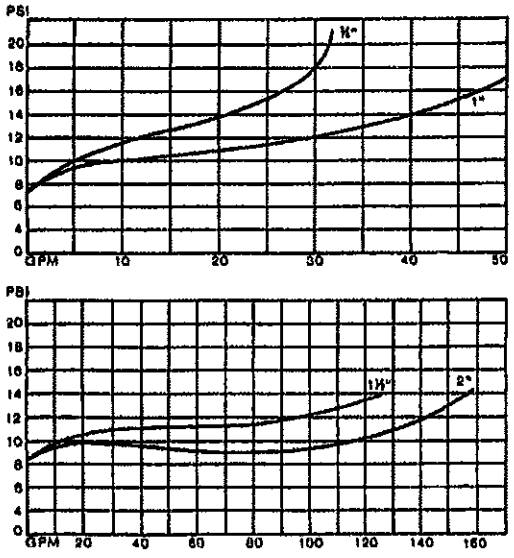


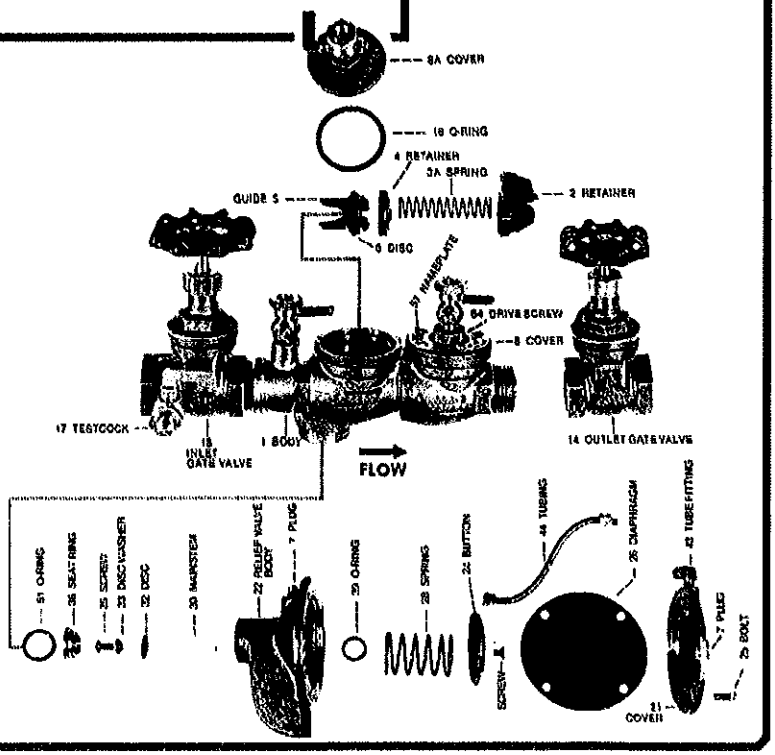
REPAIR PARTS & KITS - MODEL 835, 835B

FIG.	DESCRIPTION	Q.	3/4" 835B	3/4" 835	1" 835B	1" 835	1-1/2" 835B	1-1/2" 835	2" 835B	2" 835
2	Retainer	2	600-151	600-151	600-151	600-151	100-692	100-692	100-692	100-692
3A	Spring — 1st Check Spring		630-102	780-491	630-102	780-491	630-110	780-492	630-110	780-492
3B	Spring — Not Shown — 2nd Check Spring		630-103	630-091	630-103	630-091	630-109	630-092	630-109	630-092
14	Gate Valve		780-131	780-131	780-106	780-100	780-108	780-108	780-109	780-109
15	Gate Valve — Tapped		780-132	780-133	780-133	780-133	780-120	780-120	700-121	780-121
17	Test Cock	4	780-114	780-114	780-114	780-114	780-166	780-166	780-166	780-166
21	Diaphragm Cover		780-606	780-420	780-606	780-420	780-600	780-287	780-600	780-287
25	Capscrew	4	700-018	700-018	700-018	700-018	—	—	—	—
25	Capscrew	6	—	—	—	—	700-117	700-088	700-117	700-088
29	Spring		780-424	780-424	780-424	780-424	780-291	780-291	780-291	780-291
35	Seat Ring		780-603	780-429	780-603	780-429	780-626	780-295	780-602	780-295
33	Screw		700-107	700-107	700-107	700-107	700-106	700-106	700-106	700-106
KITS	Check Kit (4, 5, 6, 16)		905-026	905-026	905-026	905-026	905-027	905-027	905-027	905-027
	Rubber Parts (5, 16)	2	—	780-503	—	780-503	902-392	780-504	902-392	780-504
	Relief Valve (Inc. 36, 51)		780-582	—	780-582	—	780-601	902-392	780-601	902-392
	Relief Valve Kit (26, 28, 30, 32, 33, 35, 36, 39, 51)		905-030	902-403	905-030	902-403	905-031	902-404	905-031	902-404
	Bonnet Kit w/Name Plate (6, 16, 54, 57)		905-013	902-409	905-014	902-408	905-015	902-410	905-016	902-407
	Relief Valve Rubber Parts (26, 28, 36, 51)		905-032		905-032		905-033		905-033	
	Bonnet Kit (7, 8A, 16)		902-389		905-389		905-381		905-381	

MODEL 835B

FLOW CURVES



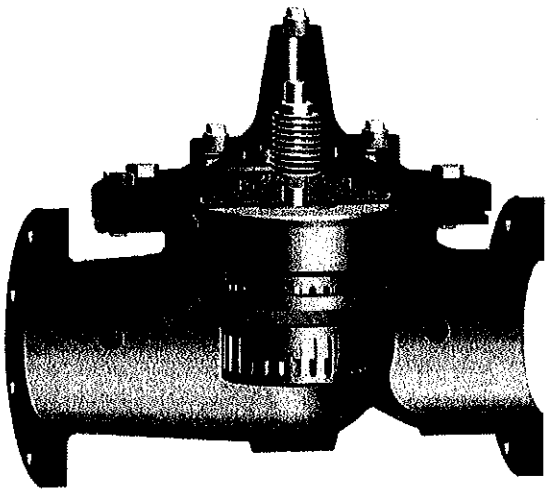


CLA-VAL™

— MODEL — **100-01KO**

(Full Internal Port)

Anti-Cavitation Hytrol Valve



- **Virtually Cavitation Free Operation**
- **Severe Service Design - High Pressure Differentials**
- **Reduced Noise and Vibration**
- **316 Stainless Steel Disc Guide and Seat Standard**
- **Drip-Tight, Positive Sealing**
- **Service Without Removal From Line**
- **Retrofit to Standard Hytrol Valves**

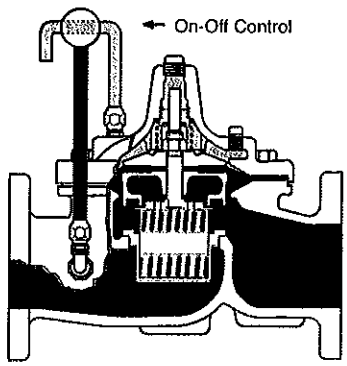
The Cla-Val Model 100-01KO Anti-Cavitation Hytrol Valve is designed for applications where there is a high potential for damage from cavitation. Specify this valve series for a wide variety of control valve applications having pressure differentials up to 300 psid or for relief valves having atmospheric discharge up to 150 psid.

The 100-01KO Hytrol main valve provides optimum internal pressure control through a unique anti-cavitation trim design. Constructed of 316 Stainless Steel, the seat and disc guide trim components feature dual interlocked sleeves containing radial slots that deflect internal flow to impinge upon itself in the center of the flow path, harmlessly dissipating the potential cavitation damage. This unique design also lessens the possibility of fouling if large particles in the water are present due to the large flow path of the radial slots.

The 100-01KO Hytrol is the basic valve used in Cla-Val Automatic Control Valves for high differential applications requiring remote control, pressure regulation, solenoid operation, rate of flow control, or liquid level control.

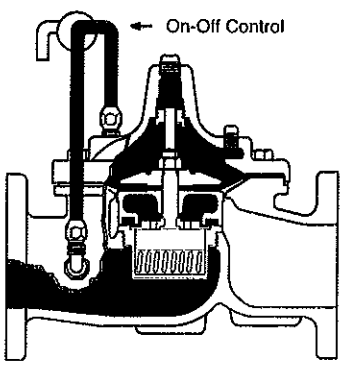
The Anti-Cavitation Trim components can be retrofitted to existing valves if the application indicates an appropriate need. Please consult factory for details.

Principle of Operation



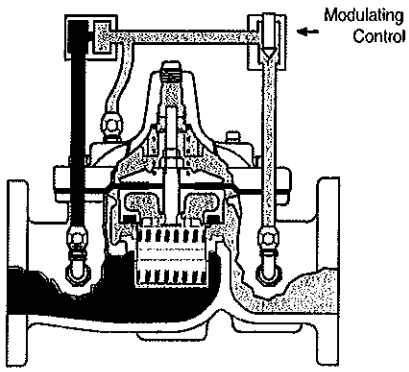
Full Open Operation

When pressure in the cover chamber is relieved to a zone of lower pressure, the line pressure at the valve inlet opens the valve, allowing full flow.



Tight Closing Operation

When pressure from the valve inlet is applied to the cover chamber, the valve closes drip-tight.



Modulating Action

The valve holds any intermediate position when operating pressures are equal above and below the diaphragm. A Cla-Val "Modulating" Pilot Control will allow the valve to automatically compensate for line pressure changes.

CLA-VAL™

Specifications

Pattern	Globe	Angle	Grooved End
Size	1½" - 24"	2" - 16"	1½" - 8"

Operating Temp. Range

Fluids
-40° to 180° F

Model 100-01KO

NSF APPROVED (4" - 24")

Pressure Ratings (Recommended Maximum Pressure - psi)

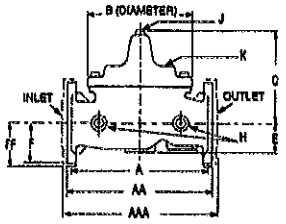
Valve Body & Cover		Pressure Class			
		Flanged			Threaded
Grade	Material	ANSI Standards*	150 lb.	300 lb.	End** Details
ASTM A536	Ductile Iron	B16.42	250	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400
ASTM B62	Bronze	B16.24	225	400	400

Note: * ANSI standards are for flange dimensions only. Flanged valves are available faced but not drilled.
** End Details machined to ANSI B2.1 specifications.

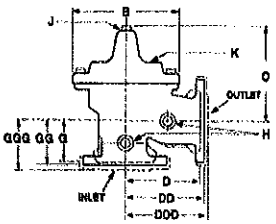
Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	1½" - 24"	1½" - 16"	1½" 16"
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Stainless Steel is Standard		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		

For material options not listed consult factory.
Cla-Val manufactures valves in more than 50 different alloys.

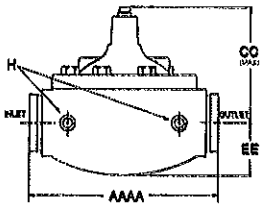


100-01 (Globe)

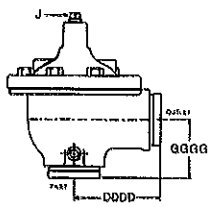


100-01 (Angle)

Note:
Consult Factory on 10",12", 16" angle pattern



100-01 Grooved (Globe)



100-01 Grooved (Angle)

Valve Size (Inches)	1½	2	2½	3	4	6	8	10	12	14	16	24	(mm)	40	50	65	80	100	150	200	250	300	350	400	600
A Threaded	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	A	184	238	279	318	—	—	—	—	—	—	—	—
AA 150 ANSI	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	61.50	AA	216	238	279	305	381	508	645	756	864	991	1051	1562
AAA 300 ANSI	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50	63.24	AAA	229	254	295	337	397	533	670	790	902	1029	1105	1606
AAAA Grooved End	8.50	9.00	11.00	12.50	15.00	20.00	25.38	—	—	—	—	—	AAAA	216	228	—	318	381	508	645	—	—	—	—	—
B Dia.	5.62	6.62	8.00	9.12	11.50	15.75	20.00	26.62	28.00	32.75	35.50	53.16	B	143	168	203	232	292	400	508	600	711	832	902	1350
C Max.	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12	20.88	24.19	25.00	43.93	C	140	165	192	208	270	340	406	435	530	614	635	1116
CC Max.	4.75	5.75	7.56	7.25	9.31	12.12	14.62	—	—	—	—	—	CC	120	146	—	184	236	308	371	—	—	—	—	—
D Threaded	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—	D	83	121	140	159	—	—	—	—	—	—	—	—
DD 150 ANSI	4.00	4.75	5.50	6.00	7.50	10.00	12.75	14.88	17.00	19.50	20.81	—	DD	102	121	140	152	191	254	324	378	432	495	528	—
DDD 300 ANSI	4.25	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25	21.62	—	DDD	108	127	149	162	200	267	337	395	451	514	549	—
DDDD Grooved End	—	4.75	—	6.00	7.50	—	—	—	—	—	—	—	DDDD	—	121	—	152	191	—	—	—	—	—	—	—
E	1.12	1.50	1.69	2.06	3.19	4.31	5.31	9.25	10.75	12.63	15.50	17.75	E	29	38	43	52	81	110	135	235	273	321	394	451
EE Grooved End	2.00	2.50	—	3.12	4.25	6.00	7.56	—	—	—	—	—	EE	52	64	—	79	108	152	192	—	—	—	—	—
F 150 ANSI	2.50	3.00	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.50	11.75	19.25	F	64	76	89	95	114	140	171	203	241	267	298	489
FF 300 ANSI	3.06	3.25	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75	19.25	FF	78	83	95	105	127	159	191	222	260	292	324	489
G Threaded	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—	G	48	83	102	114	—	—	—	—	—	—	—	—
GG 150 ANSI	4.00	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.87	15.69	—	GG	102	83	102	102	127	152	203	219	349	378	399	—
GGG 300 ANSI	4.25	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50	—	GGG	102	89	110	111	135	165	216	236	368	397	419	—
GGGG Grooved End	—	3.25	—	4.75	5.00	—	—	—	—	—	—	—	GGGG	—	83	—	108	127	—	—	—	—	—	—	—
H NPT Body Tapping	⅜	⅜	½	½	¾	¾	1	1	1	1	1	1	H NPT	⅜	⅜	½	½	¾	¾	1	1	1	1	1	1
J NPT Cover Center Plug	¼	¼	¼	¼	¾	¾	1	1	1¼	2	2	1½	J NPT	¼	¼	¼	¼	¾	¾	1	1	1¼	2	2	1½
K NPT Cover Tapping	⅜	⅜	½	½	¾	¾	1	1	1	1	1	1	K NPT	⅜	⅜	½	½	¾	¾	1	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	10-32	10-32	¼-28	¼-28	⅜-24	⅜-24	⅜-24	⅜-24	½-20	½-20	¾-16	Stem Thread	10-32	10-32	10-32	¼-28	¼-28	⅜-24	⅜-24	⅜-24	⅜-24	½-20	½-20	¾-16
Stem Travel	0.4	0.6	0.7	0.8	1.1	1.7	2.3	2.8	34	4.0	4.5	6.75	StemTr	10	15	18	20	28	43	58	71	86	102	114	171
Approx. Ship Wt. Lbs.	15	35	50	70	140	285	500	780	1165	1600	2265	6200	Wt.Kgs	7	16	23	32	64	129	227	354	528	726	1027	2812

Cla-Val Control Valves with KO ANTI-CAVITATION Trim operate with maximum efficiency when mounted in horizontal piping with the main valve cover Up. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.

Functional Data

Model 100-01KO

Valve Size		Inches	1½	2	2½	3	4	6	8	10	12	14	16	24
		mm.	40	50	65	80	100	150	200	250	300	350	400	600
C_V Factor	Globe Pattern	Gal./Min. (gpm.)	14	25	37	52	90	218	362	469	810	1100	1200	3900
		Litres/Sec. (l/s.)	3.4	6.0	8.9	12.5	21.6	52	87	113	194	264	288	938
	Angle Pattern	Gal./Min. (gpm.)	15	26	39	55	95	232	388	479	790	1075	1175	—
		Litres/Sec. (l/s.)	3.6	6.2	9.4	13.2	22.8	56	93	115	190	258	282	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	196	237	277	416	572	858	1315	2444	2118	1937	3022	4532
		Meters (m.)	60	72	84	127	174	262	401	745	646	590	921	1381
	Angle Pattern	Feet (ft.)	171	219	250	372	514	757	1145	2133	2226	2021	3152	—
		Meters (m.)	52	67	76	113	157	231	349	650	678	616	961	—
K Factor	Globe Pattern		30.6	26.1	24.3	29.3	29.0	25.5	27.7	41.0	27.7	22.8	31.4	28.9
	Angle Pattern		26.7	24.1	21.8	26.2	26.0	22.5	24.1	35.8	29.1	23.8	32.8	—
Liquid Displaced from Cover Chamber When Valve Opens		U.S. Gal.	0.2	.03	.04	.08	.17	.53	1.26	2.5	4.0	6.5	9.6	29
		Litres	0.8	.12	.16	.30	.64	2.0	4.8	9.5	15.1	25.6	36.2	110

For assistance in selecting appropriate valve options or valves manufactured with special design requirements, please contact our Regional Sales Office or Factory.

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Model 100-01KO Flow Chart

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop (ΔP):

$$C_V = \frac{Q}{\sqrt{\Delta P}} \qquad Q = C_V \sqrt{\Delta P} \qquad \Delta P = \left(\frac{Q}{C_V}\right)^2$$

K Factor (Resistance Coefficient)
The Value of K is calculated from the formula: $K = \frac{894 d^4}{C_V{}^2}$
(U.S. system units)

Equivalent Length of Pipe
Equivalent lengths of pipe (L) are determined from the formula: $L = \frac{K d}{12 f}$
(U.S. system units)

Fluid Velocity
Fluid velocity can be calculated from the following formula: $V = \frac{.4085\ Q}{d^2}$
(U.S. system units)

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

d = inside pipe diameter of Schedule 40 Steel Pipe (inches)

f = friction factor for clean, new Schedule 40 pipe (dimensionless) (from Cameron Hydraulic Data, 18th Edition, P 3-119)

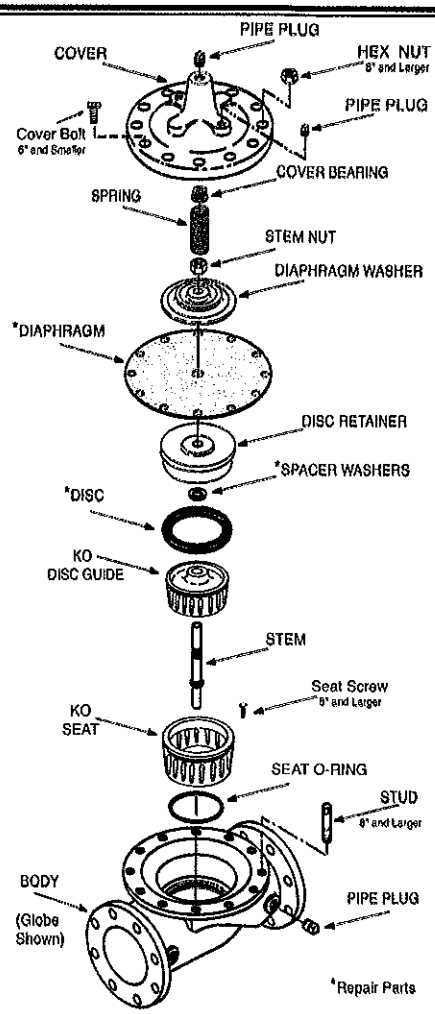
K = Resistance Coefficient (calculated)

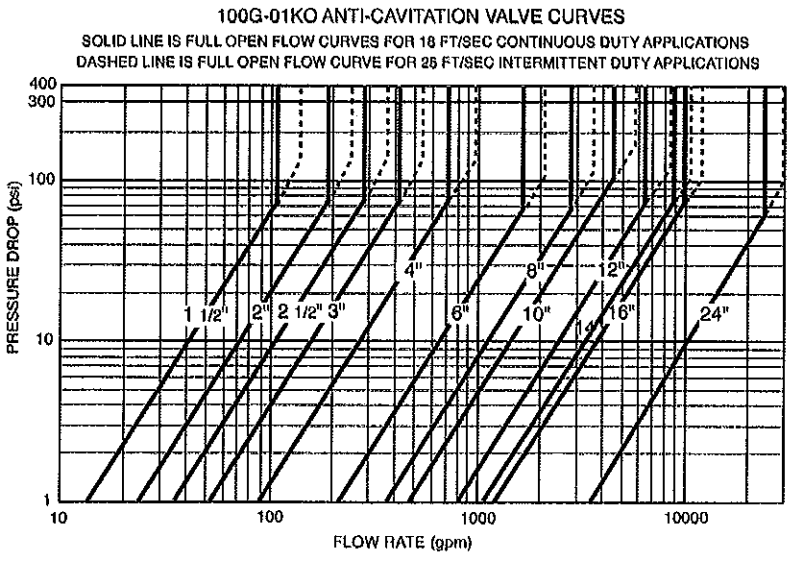
L = Equivalent Length of Pipe (feet)

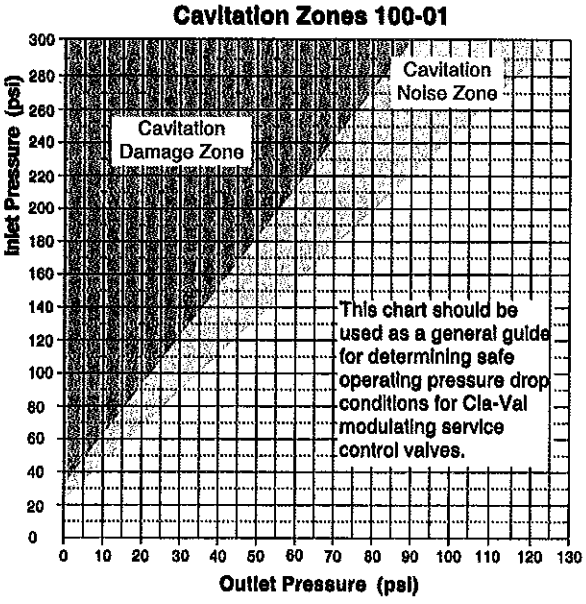
Q = Flow Rate in U.S. (gpm) or (l/s)

V = Fluid Velocity (feet per second) or (meters per second)

ΔP = Pressure Drop in (psi) or (bar)







Notes: On Operating Differential

1. For atmospheric discharge, the maximum inlet pressure cannot exceed 150 psi.
2. For pressure differentials greater than 300 psi the maximum flow velocity should not exceed 18 ft/sec.
3. Flow velocities greater than 25 ft/sec are not recommended.
4. Recommended minimum flow velocity is 1 ft/sec.
5. Consult factory for conditions exceeding these recommendations.

100-01KO Hytrol Main Valve with Anti-Cavitation Trim Purchase Specifications

Function

The valve shall be hydraulically operated, single diaphragm actuated, globe pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearing installed, and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls. Ductile Iron is standard, other materials shall be available. No fabrication or welding shall be used in the manufacturing process.

Description

The anti-cavitation features of the seat and disc guide detail shall have flow slots equally spaced around their perimeters. The seat slots shall be orientated around the perimeter of the seat so that fluid entering the valve shall flow through the seat slot detail such that the fluid flow converges in the center chamber of the seat allowing potential cavitation to dissipate. The disc guide slots shall be positioned around the perimeter of the disc guide, configured and oriented in an angular direction so that fluid flow exiting through the slots is diverted away from direct impact into pressure boundary surfaces. Flow exiting the disc guide slots is directed in an angular path to increase the distance between the slot geometry and pressure boundary surfaces. If cavitation conditions exist, the increased distance between the slots and pressure boundary surfaces minimizes the potential for damage by allowing the cavitation bubbles to dissipate before they come in contact with pressure boundary surfaces. Anti-cavitation characteristics shall be controlled by the described slotted seat and disc guide components. The disc guide shall slide in the seat and allow controlled flow through the seat slots into the central seat chamber where flow shall continue from the seat chamber and exit through the angularly oriented slots of the disc guide. The seat and disc guide features used together shall provide anti-cavitation characteristics suitable for applications where a large controlled pressure drop is desired.

The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The diaphragm must withstand a Mullins burst test of a minimum of 600 psi per layer of nylon fabric and shall be cycle tested 100,000 times to insure longevity. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully open or fully closed position.

The valve seat in six inch and smaller size valves shall be threaded into the body. Valve seat in eight inch and larger size valves shall be retained by flat head machine screws for ease of maintenance. The seat shall be of the solid, one-piece design and shall have a minimum of a five degree taper on the seating surface for positive drip-tight shut-off. Pressed-in bearings and/or multi-piece seats shall not be permitted.

To insure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. No "pinned" covers to the valve body shall be permitted. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline.

The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of shipment, provided the valve is installed and used in accordance with all applicable instructions. The valve manufacturer shall be able to supply a complete line of equipment from 1¼" through 48" sizes and a complete selection of complementary equipment.

Material Specification

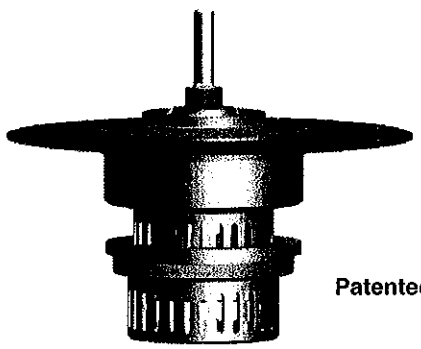
Valve Size:
Main Valve Body and Cover:
Main Valve Trim:
End Detail:
Pressure Rating:
Temperature Range:
Coating:
Desired Options:

Application Information

Inlet/Outlet Pressures:
Flow Rate:
Pipe Diameter:
Function (i.e. - Pressure Reducing, Pressure Relief, etc.):

This valve shall be a Cla-Val Model No. 100-01KO Hytrol Main Valve with Anti-Cavitation Trim as manufactured by Cla-Val, Newport Beach, CA

Note: Add this Hytrol Anti-Cavitation Trim Purchase Specification to main valve specification for control valves where there is a high potential for cavitation damage. Please contact our Regional Sales Offices or Factory for assistance.



Patented

The Anti-Cavitation Trim components can be retrofitted to existing Hytrol valves if the application indicates an appropriate need. Please consult factory for details.

CLA-VAL
PO Box 1325 Newport Beach CA 92659-0325
Phone: 949-722-4800 • Fax: 949-548-5441

CLA-VAL CANADA
4687 Christie Drive
Beamsville, Ontario
Canada LOR 1B4
Phone: 905-563-4963
Fax: 905-563-4040

CLA-VAL EUROPE
Chemin dés Mesanges 1
CH-1032 Romanel/
Lausanne, Switzerland
Phone: 41-21-643-15-55
Fax: 41-21-643-15-50

www.cla-val.com

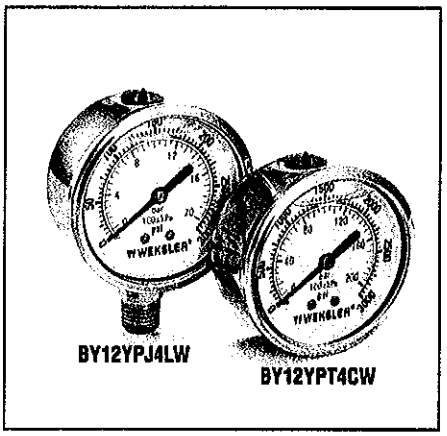
Represented By:

WEKSLER®

Liquid Filled Gauges, SS Case Bronze Tube, Brass Socket ±3-2-3% Accuracy

STANDARD FEATURES

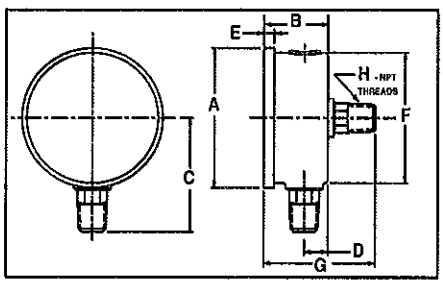
- Available in 40mm, 50mm, 63mm and 100mm sizes
- Stainless steel case and ring with plastic window
- ⅛ NPT back connection available in 40mm size; ¼ NPT lower and back connection available in 50mm and 63mm sizes; ¼ NPT lower connection available in 100mm size
- Dual scale dials with bar/kPa in blue (inner scale); psi in black (outer scale); on white background
- Panel mount kits available



CATALOG NUMBERS

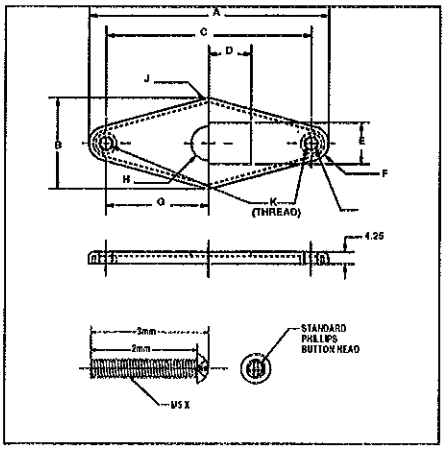
Dial Size	40mm	50mm		63mm		100mm
Connection Location	Back	Back	Bottom	Back	Bottom	Bottom
Connection NPT	⅛	¼	⅛	¼	⅛	¼
Range (psi/bar/kPa)						
30"/0/ vac. and –1/0 bar/(–100/0 kPa)	BY10YVC8CW	BY11YVC4CW	BY11YVC4LW	BY12YVC4CW	BY12YVC4LW	BY14YVC4LW
30"/0/30 psi and –1/0/2 bar (–100/0/200 kPa)	—	—	—	BY12YCB4CW	BY12YCB4LW	—
30"/0/60 psi and –1/0/4 bar (–100/0/400 kPa)	BY10YCC8CW	BY11YCC4CW	BY11YCC4LW	BY12YCC4CW	BY12YCC4LW	BY14YCC4LW
30"/0/150 psi and –1/0/10 bar (–100/0/1000 kPa)	—	—	—	BY12YCE4CW	BY12YCE4LW	—
0-15 psi and 0/1 bar (100 kPa)	—	—	—	BY12YPC4CW	—	—
0-30 psi and 0/2 bar (200 kPa)	BY10YPD8CW	BY11YPD4CW	BY11YPD4LW	BY12YPD4CW	BY12YPD4LW	BY14YPD4LW
0-60 psi and 0/4 bar (400 kPa)	BY10YPE8CW	BY11YPE4CW	BY11YPE4LW	BY12YPE4CW	BY12YPE4LW	BY14YPE4LW
0-100 psi and 0/7 bar (700 kPa)	BY10YPF8CW	BY11YPF4CW	BY11YPF4LW	BY12YPF4CW	BY12YPF4LW	BY14YPF4LW
0-160 psi and 0/11 bar (1100 kPa)	BY10YPG8CW	BY11YPG4CW	BY11YPG4LW	BY12YPG4CW	BY12YPG4LW	BY14YPG4LW
0-200 psi and 0/14 bar (1400 kPa)	—	—	—	BY12YPH4CW	BY12YPH4LW	—
0-300 psi and 0/21 bar (2100 kPa)	BY10YPJ8CW	BY11YPJ4CW	BY11YPJ4LW	BY12YPJ4CW	BY12YPJ4LW	BY14YPJ4LW
0-600 psi and 0/42 bar (4200 kPa)	—	—	—	BY12YPM4CW	BY12YPM4LW	—
0-1000 psi and 0/70 bar (7000 kPa)	BY10YPP8CW	BY11YPP4CW	BY11YPP4LW	BY12YPP4CW	BY12YPP4LW	BY14YPP4LW
0-2000 psi and 0/140 bar (14,000 kPa)	—	—	—	BY12YPS4CW	BY12YPS4LW	—
0-3000 psi and 0/210 bar (21,000 kPa)	BY10YPT8CW	BY11YPT4CW	BY11YPT4LW	BY12YPT4CW	BY12YPT4LW	BY14YPT4LW
0-5000 psi and 0/350 bar (35,000 kPa)	BY10YPV8CW	BY11YPV4CW	BY11YPV4LW	BY12YPV4CW	BY12YPV4LW	BY14YPV4LW
0/10,000 psi and 0/700 bar (70,000 kPa)	—	BY11YPY4CW	BY11YPY4LW	BY12YPY4CW	BY12YPY4LW	BY14YPY4LW

To order: specify 10-digit "catalog number" from above table. For panel mount gauges (back connection only) add "-UC" to 10-digit catalog number.



GAUGE DIMENSIONS BY10Y, BY11Y, BY12Y, BY14Y

Lower Connection Gauge Size/Type			A	B	C	D-¼	E	F
50 mm	BY11Y	Inch	2.21	1.11	1.86	0.37	0.19	2.01
		mm	56	28	47	9	5	51
63 mm	BY12Y	Inch	2.62	1.13	2.08	0.39	0.22	2.45
		mm	66	29	53	10	5	75
100 mm	BY14Y	Inch	4.29	1.42	3.14	0.46	0.29	3.88
		mm	109	36	80	12	7	98
Back Connection Gauge Size/Type			**A**	**B**	**F**	**G**	**H**	
40 mm	BY10Y	Inch	1.78	1.00	1.61	1.62	⅛	
		mm	45	25	41	41		
50 mm	BY11Y	Inch	2.21	1.11	2.02	2.05	¼	
		mm	56	28	51	52		
63 mm	BY12Y	Inch	2.62	1.13	2.45	2.05	¼	
		mm	66	29	62	52		



PANEL MOUNT ASSEMBLY FOR 40mm, 50mm, 63mm GAUGES

Part No.		A	B	C	D	E	F	G	H	J	K
40mm Clamp	Inch	2.36	1.02	189	0.45	0.44	0.94	0.94	0.20	0.10	M5X0.8
	mm	60	26	48	11.6	11.3	24	24	5	2.50	M5X0.8
50mm Clamp	Inch	2.83	1.26	2.36	0.57	0.56	0.47	1.18	0.24	0.10	M5X0.8
	mm	72	32	60	14.6	14.2	30	72	6	2.50	M5X0.8
63mm Clamp	Inch	3.27	1.26	2.80	0.57	0.56	0.47	1.40	0.24	0.10	M5X0.8
	mm	83	32	71	14.6	14.2	12	35.5	6	2.50	M5X0.8

ANVIL® INTERNATIONAL, INC. Formerly Grinnell

1. Product Name

Anvil Supports and Hangers, including:

- Copper tubing hangers
- Pipe rings
- Clevis
- Steel pipe clamps
- Socket clamps
- Beam clamps
- Structural attachments
- Ceiling plates and ceiling flanges
- Concrete inserts and attachments
- Rod attachments
- Pipe supports
- Pipe shields and saddles
- Pipe rolls
- Guides and slides
- Engineered hangers

2. Manufacturer

Anvil International, Inc.
110 Corporate Drive
Suite 10
Portsmouth, NH 03802-3180
(603) 422-8000
Fax: (603) 422-8033
www.anvilintl.com

3. Product Description

BASIC USE

Anvil pipe hangers and supports are designed to provide accurate supporting loads for piping throughout the full range of its movement, along with simple load adjustment. These pipe hangers and supports are suitable for a variety of applications, including power plants, refineries, mechanical HVAC plumbing, fire protection and ships.

COMPOSITION & MATERIALS

- Pipe rings - Malleable iron, carbon steel
- Clevis - Carbon steel
- Steel pipe clamps - Carbon steel, alloy, stainless steel
- Socket clamps - Carbon steel
- Beam clamps - Malleable/ductile iron, hardened steel, carbon steel, forged steel
- Structural attachments - Carbon steel, malleable iron
- Ceiling plates/ceiling flanges - Plastic, cast iron, malleable iron
- Concrete inserts and attachments - Malleable iron, carbon steel; stainless steel body, fiberglass bars, polypropylene disc (iron cross design)
- Rod attachments - Carbon steel, malleable iron, forged steel
- Pipe supports - Carbon steel, cast iron
- Pipe shields and saddles - Carbon steel, alloy steel, stainless steel
- Pipe rolls - Cast iron, carbon steel
- Guides - Carbon steel; slides, carbon steel with PTFE slide plates
- Engineered hangers - Carbon steel, stainless steel, chrome molybdenum steel

4. Technical Data

APPLICABLE STANDARDS

National Fire Protection Association (NFPA) - NFPA 13 Standard for the Installation of Sprinkler Systems

Federal Specifications (Fed. Spec.)

- WW-H-171E Hanger and Support, Pipe
- A-A-1192A Bracket, Pipe

Military Specifications (Mil Specs) - Mil Spec P-15877 Marine Hangers

Manufacturers Standardization Society (MSS)

- SP-58 Pipe Hangers and Support - Materials, Design and Manufacture
- SP-69 Pipe Hangers and Support - Selection and Application
- SP-77 Guidelines for Pipe Support Contractual Relationships
- SP-89 Pipe Hangers and Support - Fabrication and Installation Practices
- SP-90 Guidelines on Terminology for Pipe Hangers and Supports
- SP-127 Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application

American Society of Mechanical Engineers (ASME)

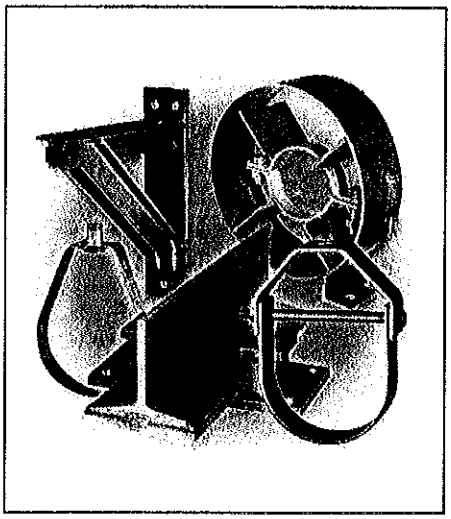
- B31.1 Power Piping
- B31.3 Chemical Plant and Petroleum Refinery Piping
- B31.9 Building Services Piping

APPROVALS

Factory Mutual (FM) - Approval Standard for Pipe Hanger Components for Automatic Sprinkler Systems

LISTINGS

Underwriters Laboratories, Inc. (UL) - Standard for Safety for Pipe Hanger Equipment for Fire Protection Service



Carbon steel and fabricated hanger components

MANUFACTURING CERTIFICATIONS

- ISO 9000
- ISO 9001
- ASME NPT
- ASME NS

PHYSICAL CHEMICAL PROPERTIES

Consult manufacturer's technical and design manual for summaries of engineering design and for material properties, allowable loading, hardness, flexural strength, bearing stresses, wind performance, seismic performance and other design parameters.

5. Installation

PREPARATORY WORK

Handle and store products according to Anvil International, Inc.'s recommendations. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Verify actual measurements and openings by field measurements before fabrication.

METHODS

Assembly methods will vary depending on the systems and components required for individual applications. For complete installation recommendations, consult manufacturer.

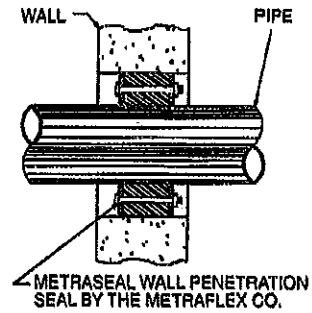
METRASEAL

MetraSeal forms a mechanical rubber seal between pipes going through walls, floors, vaults, tanks, and pipeline casings. MetraSeal makes a watertight seal and fire stop seal if UL seals are used. It can also seal the gap between an inner pipe and an outer pipe sleeve or pipeline casing. It seals the gap between electrical conduit and the outer conduit, or between electrical conduit and the wall hole it passes through.

MetraSeal is designed to make a hydrostatic seal of up to 20 psig and up to 40 feet of head. The MetraSeal, in addition to its sealing properties, helps absorb vibrations, shocks, and sound waves. It also insulates the inner pipe from all other outer structures, including outer pipe sleeves, pipeline casings, walls and tanks.

IPS = Solid, 40 or Std. Weight Pipe Size, Plastic Pipe Size, API Pipe Size, Electrical Conduit Size, Or any pipe with same O.D.
CT = Copper Tubing, Or any pipe with same O.D.
EMT = Electrical Metallic Tubing
IMC = Intermediate Metal Conduit
RSC = Rigid Steel Conduit
DI = Ductile Iron Pipe Size, Plastic Pipe Size, Or any pipe with same O.D.
CI (EH) = Cast Iron (Extra Heavy)
CI (SW) = Cast Iron (Service Weight)

TYPE	SEAL MATERIAL	PRESSURE PLATES	BOLTS & NUTS	TEMPERATURE RANGE (F°)	APPLICATIONS*
E	EPDM Black	Glass reinforced plastic	STEEL zinc dichoromate	-40 to +250	Suitable for most applications in water, both above ground and direct burial. Provides electrical insulation where cathodic protection is required.
ES	EPDM Black	Glass reinforced plastic	STAINLESS STEEL (316)	-40 to +250	Suitable for environments where the corrosion resistance of stainless steel hardware is required.
P	NITRILE	Glass reinforced plastic	STEEL zinc dichoromate	-40 to +210	Resistant to most hydrocarbons, oil, gas, jet fuel, and many solvents.
PS	NITRILE	Glass reinforced plastic	STAINLESS STEEL (316)	-40 to +210	Same as above but with corrosion resistance of stainless steel hardware.
120 (UL)	EPDM based intumescent	Steel zinc dichoromate	Steel zinc dichoromate	-40 to +250 or direct flame	Fire stop. (UL) System numbers C-AJ-1373, C-AJ-1374 & C-AJ-2328
HT	Silicone	Steel zinc dichoromate	Steel zinc dichoromate	-40 to +400	High temperature applications.



Nominal Pipe Size & Type of Pipe	Pipe O.D.	Inner Pipe Through a Core Drilled Hole			Inner Pipe Through a Wall Sleeve			Notes
		Hole Dia.	Model No./Type	Qty. of Links	Sleeve I.D.	Model No./Type	Qty. of Links	

CUSTOMER _____

PROJECT _____

ENGINEER _____

ARCHITECT _____

PRO OR P.O. NO. _____

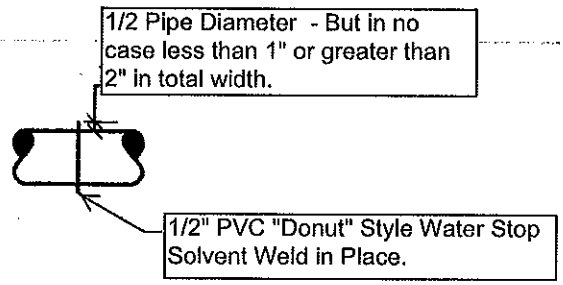
Metraflex. for pipes in motion
Chicago, IL

DESCRIPTION:

METRA SEAL

DRAWN BY:	DATE:	DRAWING:
ZB	07/02	SEAL(A)

www.metraflex.com



WATER SEAL

3/4" = 1'-0" 05/15/08