August 12, 2022

APPROVAL DRAWINGS

PROJECT NAME
CITY OF WINNIPEG #265-2022
DEACON BOOSTER PS - HEADER SPLIT

PURCHASE ORDER
0000651252

VALVE TYPE
AWWA RUBBER SEATED BUTTERFLY VALVE

CONTRACTOR:	POWER & MINE SUPPLY CO. LTD. 4-75 MERIDIAN DRIVE WINNIPEG, MB R2R 2V9
LOCAL SUPPLIER:	POWER & MINE SUPPLY CO. LTD 4-75 MERIDIAN DRIVE WINNIPEG, MB R2R 2V9 204-694-9300
MANUFACTURER:	DeZURIK 250 RIVERSIDE AVE NORTH SARTELL, MN 56377 (320) 259-2000
Factory Work Order	679260/152107
Factory Sales Order	627288/322246

DeZURIK
APCO | HILTON

250 Riverside Ave N 320-259-2000 p
Sartell, MN 56377 USA 320-259-2227 f

Affidavit of Compliance

DeZURIK BAW Butterfly Valves, sizes 3" – 72", meet the requirements of the current AWWA Standard C504-15, Rubber-Seated Butterfly Valves.

Albert W. Libke, P.E.
Engineering Director

State of Minnesota
County of Stearns
Signed and sworn before me November 12, 2015

Notary Public

WAYNE D. SCHMITZ
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2020

GNPC 15–11

info@dezurik.com
www.dezurik.com

DeZURIK
APCO | HILTON

250 Riverside Ave N 320-259-2000 p
Sartell, MN 56377 USA 320-259-2227 f

Certificate of Compliance

Date: December 20, 2017

Subject: Hydrostatic Proof of Design Verification of Structural Test

Standard: AWWA C504

Section: Section 5

Product: BAW Butterfly Valve

Size & Class: All

DeZURIK BAW Butterfly Valves are subjected to a Proof of Design hydrostatic test per Section 5 of AWWA C504. The POD test requires that each valve size be subjected to a hydrostatic pressure of twice the rated pressure applied to the closed disc. The pressure is successively applied to each side of the disc.

The test is a structural test, and is not intended to be a leakage test. AWWA C504 does not require that the time duration for the test be recorded. Therefore the times at the two times pressure was not recorded.

Albert W Libke, P.E.
Engineering Director

GNPC-17-43

info@dezurik.com
www.dezurik.com

DeZURIK
250 Riverside Avenue North
Sartell, MN 56377 USA
Ph: 320-259-2000

August 12, 2022

POWER & MINE SUPPLY CO. LTD.
4-75 MERIDIAN DRIVE
WINNIPEG, MB R2R 2V9

Subject: American Iron and Steel Step Certification for Project **"ORD73981-WINCIT"**

Work Order # "679260"

I, Rachael Nieland, certify that the (melting, bending, galvanizing, cutting, etc.) processes for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with AIS requirement as mandated by Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A – Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference.

Item, Products and/or materials:
Model BAW, AWWA Butterfly Valves
Manufacturing processes of the above products take place at the following location:

DeZURIK - Sartell Plant
250 Riverside Ave North
Sartell, Minnesota 56377
320-259-2000

This certification is to be submitted upon request to interested parties (e.g. municipalities, consulting engineers, general contractors, etc.)

If any of the above compliance statements change while providing materials to this project, please immediately notify the person(s) who is requesting to use your product(s).

Rachael Nieland

Rachael Nieland
Project Management &
Order Administration Manager
320-259- 2137Office
Rachael.nieland@dezurik.com

TABLE OF CONTENTS

A Data Sheet is included for each line item on the purchase order.
Document numbers are listed at the bottom of the Data Sheet.
Any one drawing may apply to more than one item number.
All documents are assembled in alpha/numeric order within each section.

DeZURIK

Submittal Data Sheet

Date: 08/12/22

POWER & MINE SUPPLY CO. LTD.

4-75 MERIDIAN DRIVE

WINNIPEG, MB
R2R 2V9

P.O. PO100617
FACTORY ORDER NO 152107
FACTORY SALES ORDER NO 322246
REV 0

PROJ. NAME ORD73981-WINCIT

Fact. ITEM	Cust. ITEM	QTY	DESCRIPTION	PART NO. **9724529**
1		1	BAW,66,F1,DI,NBRN-NBR,150B,DI-S1,AIS-CMC-DTR-TB-1421D2*MGB-WR5L-HD24*BCZ264	

Style	BAW	DEZURIK AWWA C504 3-72"; C516 78" and larger Rubber Seated Butterfly Valve
Size	66	66 Inch (1700mm)
End Connection	F1	Flanged Drilling; ASME Class 125/150
Body Material	DI	Ductile Iron
Packing	NBRN	Acrylonitrile Butadiene; Self Adjusting; -20 to 180° F. (-29 to 82° C.)
Seat Material	NBR	Acrylonitrile Butadiene; -20 to 180° F. (-29 to 82° C.)
Service Class	150B	AWWA Class 150B
Disc	DI	Ductile Iron with 316 Stainless Steel Edge
Shaft	S1	304 Stainless Steel shaft with 316 stainless steel pin on the 24"-36" (600-900mm) and 304 stainless steel pin on the 42"-144" (1100-3650mm)
Option	AIS	USA Iron & Steel
Option	CMC	Certificate of Material Conformance
Option	DTR	DeZURIK Standard Certified Production Hydrostatic Shell and Seat Test Report
Option	TB	DeZURIK Standard Certified Hydrostatic shell test and Bi-directional seat leak test
Coating	1421D2	12 mils minimum (non-stainless steel parts) of Blue Epoxy Tnemec 141 (NSF Std. 61) on Interior and Exterior with SP5 surface prep and Holiday Spark Test
Act Type	MGB-WR5L-HD24	Worm Gear Handwheel; 24 In Dia
Modifier	BCZ264	

- GREASE FITTING IN ACTUATOR
- 1 COAT HOUGHTON RUST VETO 344 ON MACHINED SURFACES OF END CONNECTIONS AND ON METAL SEATING SURFACE IF BARE CAST IRON OR CARBON STEEL
- SPINNER KNOB ON HANDWHEEL
- BACK SIDE OF FLANGE SPOT FACED.
- CERTIFIED PHYSICAL AND CHEMICAL TEST REPORTS PER SPEC QY00064
- AFFIDAVIT OF COMPLIANCE TO AWWA C504.
- AFFIDAVIT OF COMPLINCE FOR PAINT THICKNESS AND COATING QUALIFICATION TESTING RESULTS PER AWWA C550.
- NON-REPAIRED CASTINGS

RELATED DOCUMENTS

Z20327	DWG INST BAW F1 MG/MGB-WR5L-HD
A47550	DWG INST VALVE BAW F1 24-72"
A56179	DWG VALVE ASSY BAW F 60-72"
A61281	DWG ACT ASSY MG/MGB-WR_L-N/HD

***NOTES/COMMENTS:**

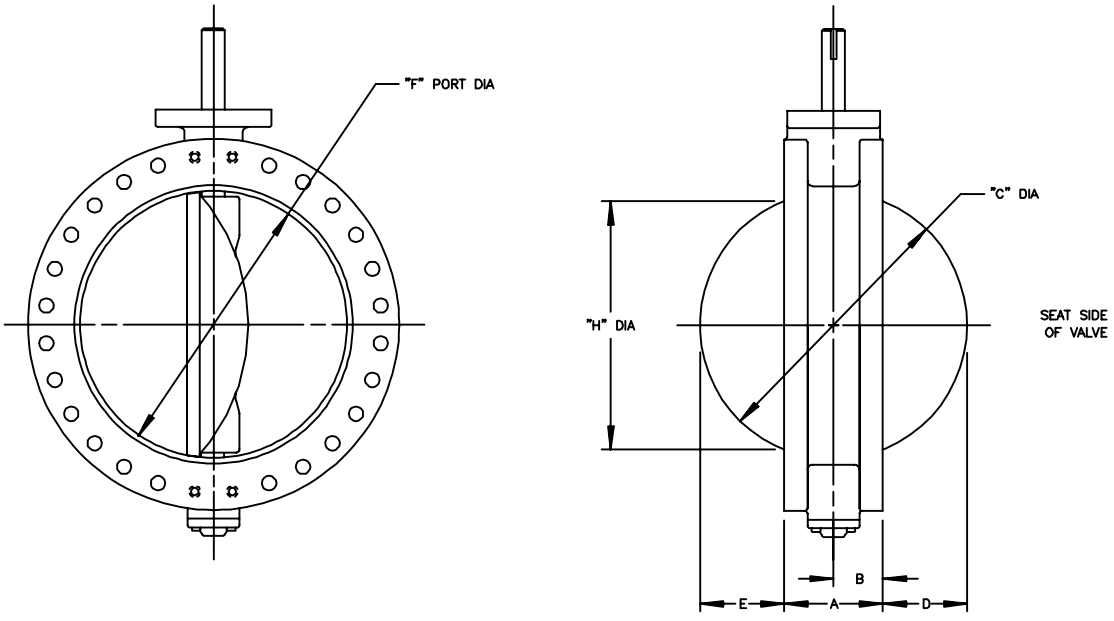
- Valve/actuator is in horizontal shaft orientation without the use of bevel/miter gear.
- Torque calculations are included for the horizontal valve shaft orientation only.
- Design conformed to AWWA M49.
- Valve/actuator is rated for 400 MLd max. design system flow rate in 66" pipe, which corresponds to 6.88 ft/s (2.1 m/s) and actuator has been sized to accomodate that torque/velocity.
- Valve body is rated up to 16 ft/s (4.88 m/s) per AWWA C504.
- Valve shaft diameter is 7.75" per AWWA C504.
- Standard valve design consists of a groove on top of valve actuator mounting flange which allows leakage to drain out and not get into actuator in the event of packing failure.
- As requested, handwheel has been positioned as close to actuator as possible given the tight space.
- Furthermore, the actuator input reducer could be rotated through 90^{o} steps so that the handwheel can be repositioned to accommodate the desired clearance in the valve chamber (ie. closest to valve body).
- Houghton Rust Veto 344 is intended to be a rust inhibitor only during transit and storage of the valve, not after installation. This material should be mechanically and/or chemically removed from the flanges prior to installation into a potable water scenario.

VALVE SIZE		VALVE CLASS	DIMENSIONS (INCHES / MILLIMETERS)						
INCH	MM		A	B	C	D	E	F	H
20	500	F2 (250B)	8.00 / 203	4.00 / 102	19.06 / 484	5.62 / 143	5.62 / 143	18.91 / 480	17.38 / 441
24	600	150B & F1 (250B)	8.00 / 203	4.00 / 102	23.06 / 586	7.51 / 191	7.51 / 191	22.91 / 582	21.68 / 551
24	600	F2 (250B)	12.00 / 305	6.00 / 152	23.06 / 586	5.51 / 140	5.51 / 140	22.91 / 582	19.75 / 502
28	700	150B & F1 (250B)	12.00 / 305	6.00 / 152	27.06 / 687	7.41 / 188	7.41 / 188	26.76 / 680	23.92 / 608
30	750	25A, 75B, 150B & F1 (250B)	12.00 / 305	6.00 / 152	29.06 / 738	8.53 / 217	8.53 / 217	28.91 / 734	26.85 / 682
30	750	F2 (250B)	12.00 / 305	6.00 / 152	29.06 / 738	8.53 / 217	8.53 / 217	28.91 / 734	26.58 / 675
36	900	25A, 75B, 150B & F1 (250B)	12.00 / 305	6.00 / 152	35.06 / 891	11.53 / 293	11.53 / 293	34.91 / 887	33.33 / 847
36	900	F2 (250B)	15.00 / 381	7.50 / 191	35.06 / 891	10.03 / 255	10.03 / 255	34.91 / 887	31.81 / 808
42	1100	25A, 75B, 150B & F1 (250B)	12.00 / 305	6.00 / 152	41.06 / 1043	14.53 / 369	14.53 / 369	40.91 / 1039	39.74 / 1009
42	1100	F2 (250B)	15.00 / 381	7.50 / 191	41.06 / 1043	13.03 / 331	13.03 / 331	40.91 / 1039	38.71 / 983
48	1200	25A, 75B, 150B & F1 (250B)	15.00 / 381	7.50 / 191	47.06 / 1195	16.02 / 407	16.02 / 407	46.91 / 1192	44.70 / 1135
48	1200	F2 (250B)	15.00 / 381	7.50 / 191	47.06 / 1195	16.02 / 407	16.02 / 407	46.91 / 1192	44.70 / 1135
54	1400	25A, 75B, 150B & F1 (250B)	15.00 / 381	7.50 / 191	53.06 / 1348	19.04 / 484	19.04 / 484	53.00 / 1346	51.00 / 1295
54	1400	F2 (250B)	15.00 / 381	7.50 / 191	53.06 / 1348	19.04 / 484	19.04 / 484	53.00 / 1346	51.00 / 1295
60	1500	75B, 150B & F1 (250B)	15.00 / 381	7.50 / 191	59.06 / 1500	22.04 / 560	22.04 / 560	59.00 / 1499	57.28 / 1455
66	1700	75B, 150B & F1 (250B)	18.00 / 457	9.00 / 229	65.06 / 1653	23.54 / 598	23.54 / 598	65.00 / 1651	62.61 / 1590
72	1800	75B, 150B & F1 (250B)	18.00 / 457	9.00 / 229	71.06 / 1805	26.54 / 674	26.54 / 674	71.00 / 1803	68.83 / 1748

SIZE	"G" (VALVE WEIGHT)										
	20	24	28	30	36	42	48	54	60	66	72
25A	N/A	N/A	N/A	1450	2200	3225	4250	N/A	N/A	N/A	N/A
75B	N/A	N/A	N/A	1700	2650	3600	4950	6550	8500	10350	13100
150B & F1 (250B)	N/A	915	1360	1850	2800	4050	5750	7500	9825	12100	15150
F2 (250B)	775	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE:

1. "G" IS BARE SHAFTED VALVE WEIGHT (LBS).
2. F1 (250B) PER ANSI B16.1 CLASS 125.
   F2 (250B) PER ANSI B16.1 CLASS 250.



M	L	K	J	H	G	F	E	D	C	B	A
01/30/19	01/02/19	08/24/08	08/28/08	01/18/06	12/09/05	02/13/04	09/11/02	03/11/02	12/03/98	04/09/97	02/07/97
50312	50312	50312	50312	50312	81373	81159	50312	60713	54690	50312	50312

DeZURIK
APCO | HILTON
www.dezurik.com

20 F2,24–72 FLANGED AWWA BUTTERFLY VALVES
SHOWING DISC CLEARANCE IN FULL OPEN POSITION,
VALVE WEIGHTS AND PORT DIAMETER

DOCT. CODE	DRAWN	APPROVED	
C1	KW	WCB	A47550
	CHECKED WCB	DATE 01/13/97	

VALVE SIZE		DIMENSIONS IN[MM]										
IN	MM	A	B	C	D	E	F	G	H	J	K	L
54	1400	15.00 [381]	3.12 [79]	38.88 [988]	35.25 [895]	62.75 [1594]	2.00 [51]	36	1-3/4-5 UNC	8	3.00 [76]	66.25 [1683]
60	1500	15.00 [381]	3.25 [83]	39.88 [1013]	37.00 [940]	69.25 [1759]	2.00 [51]	44	1-3/4-5 UNC	8	3.12 [79]	73.00 [1854]
66	1650	18.00 [457]	3.50 [89]	46.25 [1175]	43.25 [1099]	76.00 [1930]	2.00 [51]	44	1-3/4-5 UNC	8	3.38 [86]	80.00 [2032]
72	1800	18.00 [457]	3.62 [92]	50.06 [1272]	47.00 [1194]	82.50 [2096]	2.00 [51]	52	1-3/4-5 UNC	8	3.50 [89]	86.50 [2197]

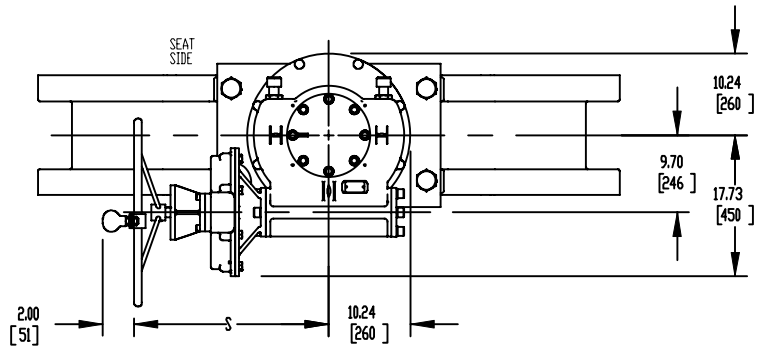
VALVE SIZE	ACTUATOR NUMBER	DIM IN [MM] R	S
54 - 72	MG-WR5L-HD24 MGB-WR5L-HD24	24.00 [610]	24.44 [621]
54 - 72	MG-WR5L-HD32 MGB-WR5L-HD32	31.50 [800]	24.44 [621]
60 - 66	MG-WR5L-HD36 MGB-WR5L-HD36	36.00 [914]	24.44 [621]

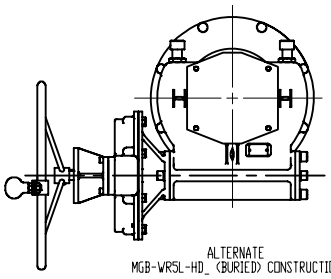
A	VALVE
B	ACTUATOR

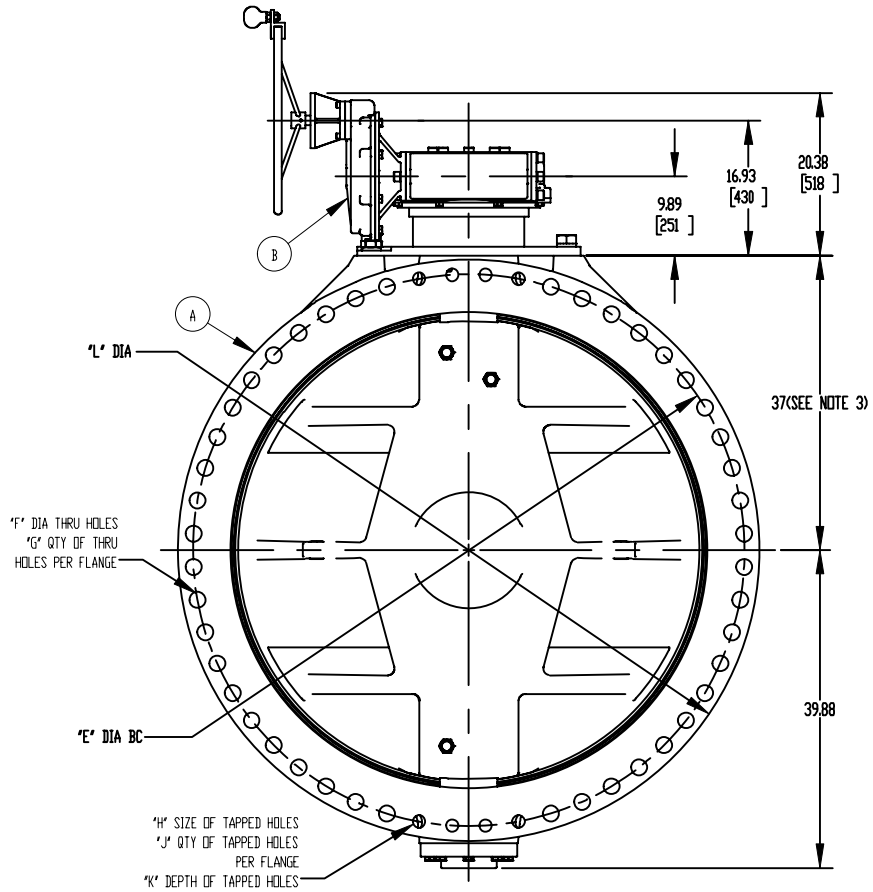
NOTES:

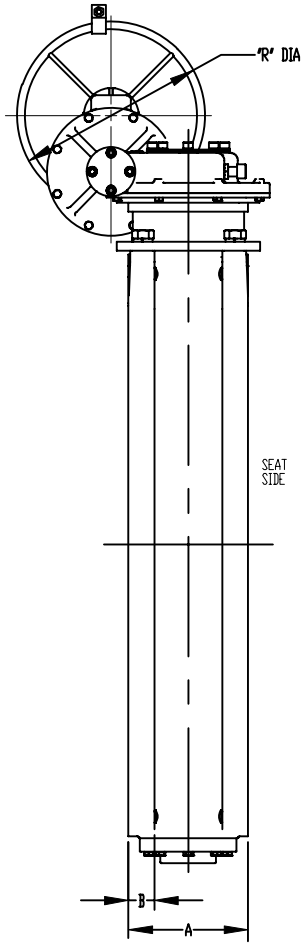
1. FLANGES ARE FLAT FACED WITH DIMENSIONS AND DRILLING TO ANSI B16.1 CLASS 125 EXCEPT FOR TAPPED HOLES AS INDICATED. SEE A26506 FOR NON-ANSI FLANGED DATA.
2. 192 TURNS OF HANDWHEEL ARE REQUIRED TO OPEN VALVE.
3. DIMENSION "D" IS: 45.75[1162.1] FOR SIZE 72 CLASS 75 B VALVE.

NOTICE
THIS DRAWING DOES NOT SHOW ACTUATOR ACCESSORIES. IF ACCESSORIES ARE REQUIRED, REFER TO THE APPROPRIATE ACCESSORY INSTALLATION DRAWING FOR DIMENSIONS AND OTHER RELATED INFORMATION.

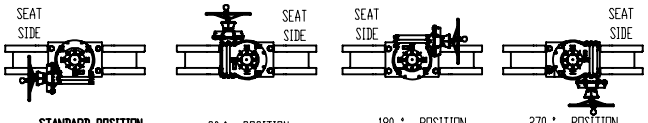








ACTUATOR MOUNTING POSITIONS



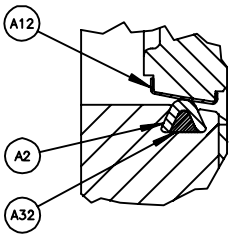
STANDARD POSITION SHOWN IN THIS DRAWING | 90° POSITION | 180° POSITION | 270° POSITION

G	F	E	D	C	B	A	RLP	08/11/22

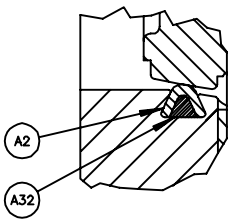
DeZURIK
APCO | HILTON
www.dezurik.com

BAW BUTTERFLY VALVE SIZE 54"–72" FLANGED
MG–WR5L–HD_OR MGB–WR5L–HD_HANDWHEEL ACTUATOR
WITH SPINNER KNOB

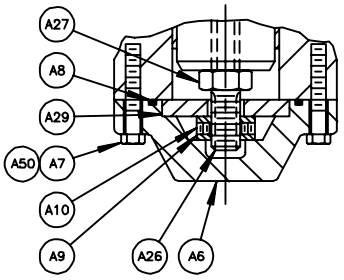
DOCT. CODE	DRAWN	APPROVED	
C1	JE	GK	Z20327
	CHECKED	DATE	
	GK	8/11/22	



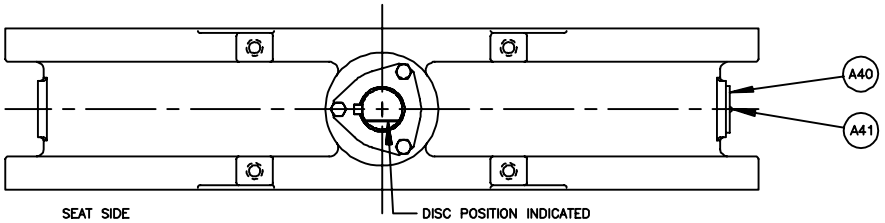
DETAIL "A"
(ENLARGED)



DETAIL "A"
STAINLESS STEEL DISC (OPTIONAL)
(ENLARGED)

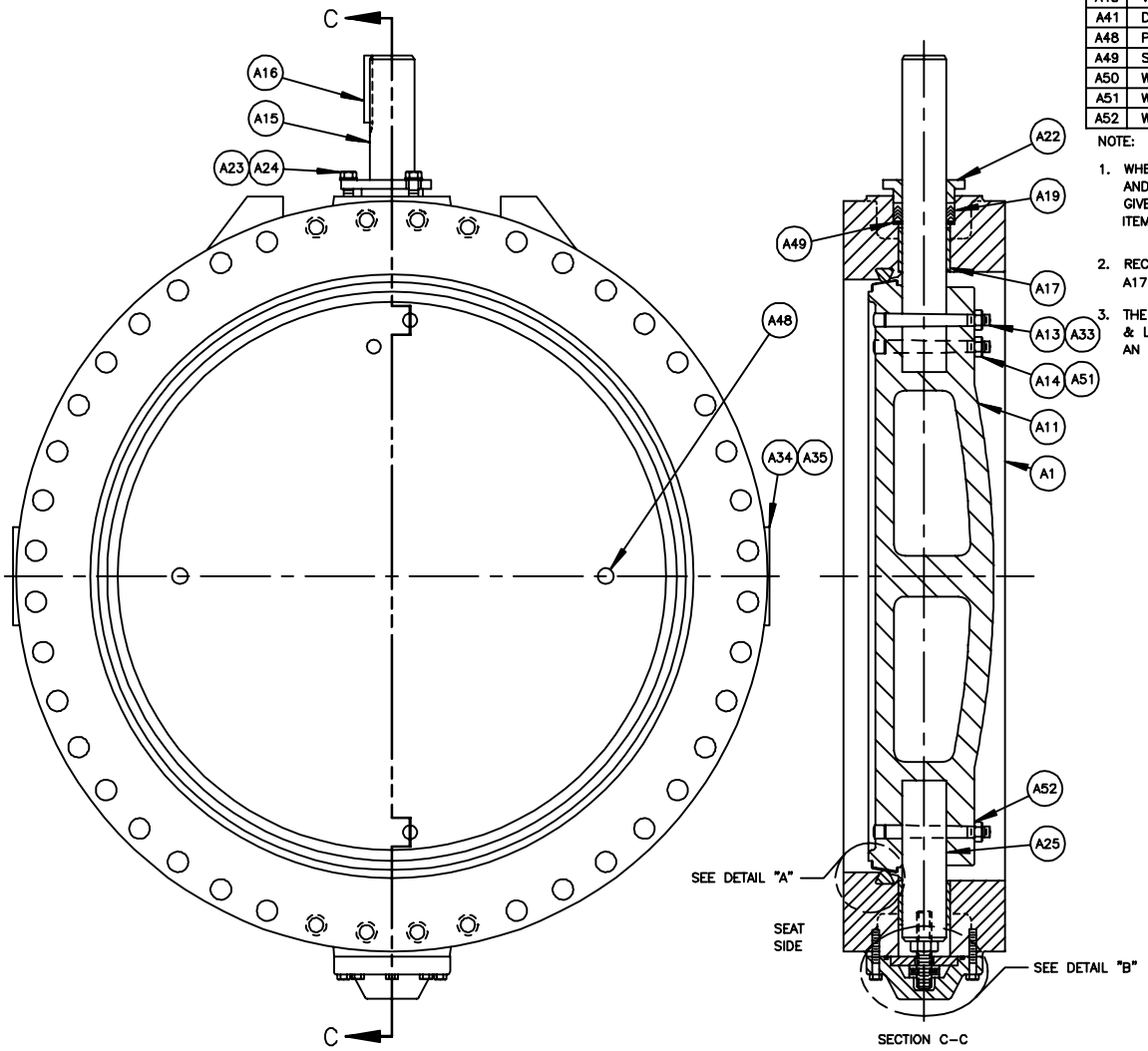


DETAIL "B"
(ENLARGED)



SEAT SIDE

DISC POSITION INDICATED
BY LINE ON TOP OF SHAFT



SECTION C–C

NO	PART NAME	QTY
A1	BODY	1
A2	SEAT	1
A3		
A4		
A5		
A6	THRUST BEARING COVER	1
A7	SCREW	8
A8	O–RING	1
A9	THRUST COLLAR	1
A10	SET SCREW	2
A11	DISC	1
A12	DISC EDGE (EXCEPT SST DISC)	1
A13	PIN	3
A14	NUT	3
A15	UPPER SHAFT	1
A16	KEY	1
A17	BEARING	2
A18		
A19	PACKING	–
A20		
A21		
A22	GLAND	1
A23	SCREW	3
A24	WASHER	3
A25	LOWER SHAFT	1
A26	ADJUSTING SCREW	1
A27	JAM NUT	1
A28		
A29	THRUST PLATE	1
A30		
A31		
A32	EPOXY	–
A33	O–RING	3
A34	SCREW	4
A35	CAUTION TAG	2
A40	VALVE CLASSIFICATION PLATE (WHEN REQ'D)	1
A41	DRIVE SCREW (USED WITH A40)	2
A48	PLUG (SST DISC ONLY)	2
A49	SUPPORT RING (PTFE PACKING ONLY)	1
A50	WASHER (FUSION COATING)	8
A51	WASHER (FUSION COATING)	2
A52	WASHER (FUSION COATING)	1

NOTE:

1. WHEN ORDERING PARTS, SPECIFY VALVE SIZE AND MODEL NUMBER FROM DATA PLATE, ALSO GIVE DRAWING NUMBER WITH PART NAME, ITEM NUMBER AND QUANTITY.
2. RECOMMENDED SPARE PARTS ARE ITEMS NO. A2, A8, A17 & A19.
3. THE DISC, ITEM NO. A11, UPPER SHAFT, ITEM NO. A15 & LOWER SHAFT, ITEM NO. A25 MUST BE ORDERED AS AN ASSEMBLY.

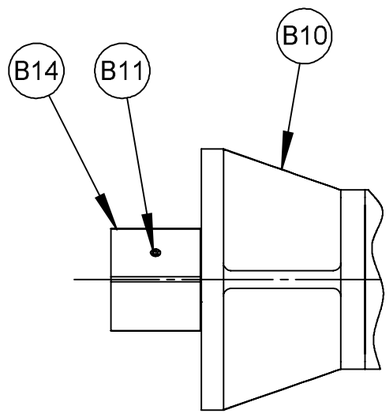
G	83480	07/31/17
F	61892	12/20/12
E	82135	12/05/12
D	82043	01/21/11
C	61892	12/15/10
B	61394	07/18/08
A		

DeZURIK
ACO | HILTON
www.dezurik.com

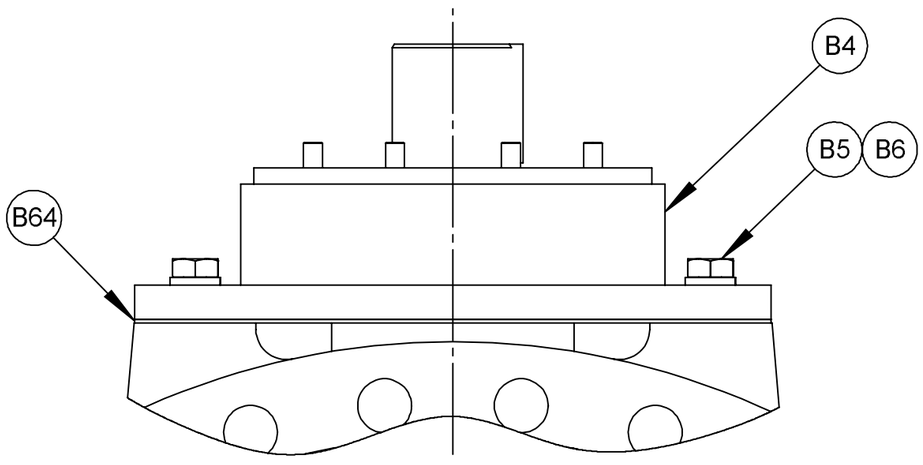
BAW BUTTERFLY VALVE SIZE 60–72
FLANGED VALVE ASSEMBLY

DOCT. CODE	DRAWN	APPROVED
C1	SJ	SJ
	CHECKED	DATE
	SJ	05/27/05

A56179



NUT ACTUATOR

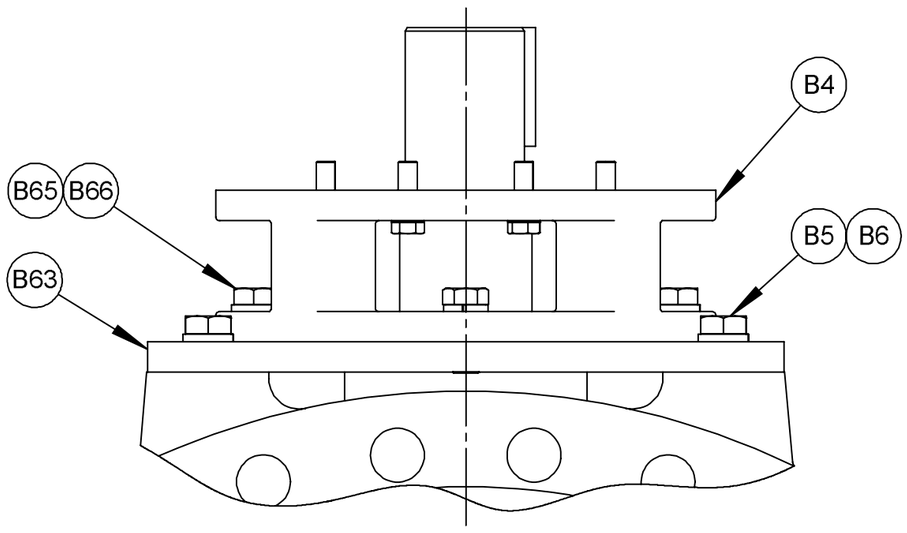


28 - 48 F2 VALVES WITH NON-ADJUSTABLE PACKING
(ACTUATOR NOT SHOWN)

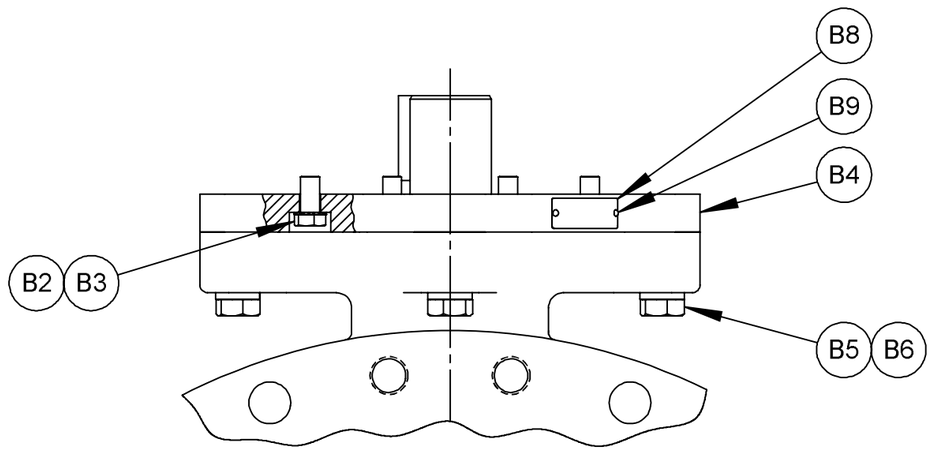
NO	PART NAME	QTY
B1		
B2	SCREW (WR1L ACT'R)	4
B2	SCREW (WR2L - WR5L ACT'RS)	8
B3	LOCKWASHER (WR1L ACT'R)	4
B3	LOCKWASHER (WR2L - WR5L ACT'RS)	8
B4	ADAPTOR	1
B5	SCREW (28 - 42 VALVES)	4
B5	SCREW (48 VALVE W/O ENK)	6
B5	SCREW (54-72 VALVES)	3
B6	LOCKWASHER (28 - 42 VALVES) (54 - 72 VALVES)	4
B6	LOCKWASHER (48 VALVE W/O ENK)	6
B8	DATA PLATE	1
B9	DRIVE SCREW	2
B10	ACTUATOR	1
B11	SET SCREW	1
B12	HANDWHEEL	1
B14	WRENCHING SQUARE	1
B30	OPEN TAG	1
B31	DRIVE SCREW	2
B32	DRIVE SLEEVE	1
B33	STUD (54 - 72 VALVES)	1
B34	NUT (54 - 72 VALVES)	1
B63	ADAPTOR PLATE (28-48 F2)	1
B64	LOWER PLATE (28-48 F2 BURIED SERVICE)	1
B65	SCREW (28-48 F2 ADJUSABLE PACKING)	4
B66	LOCK WASHER (28-48 F2 ADJUSABLE PACKING)	4

NOTE:

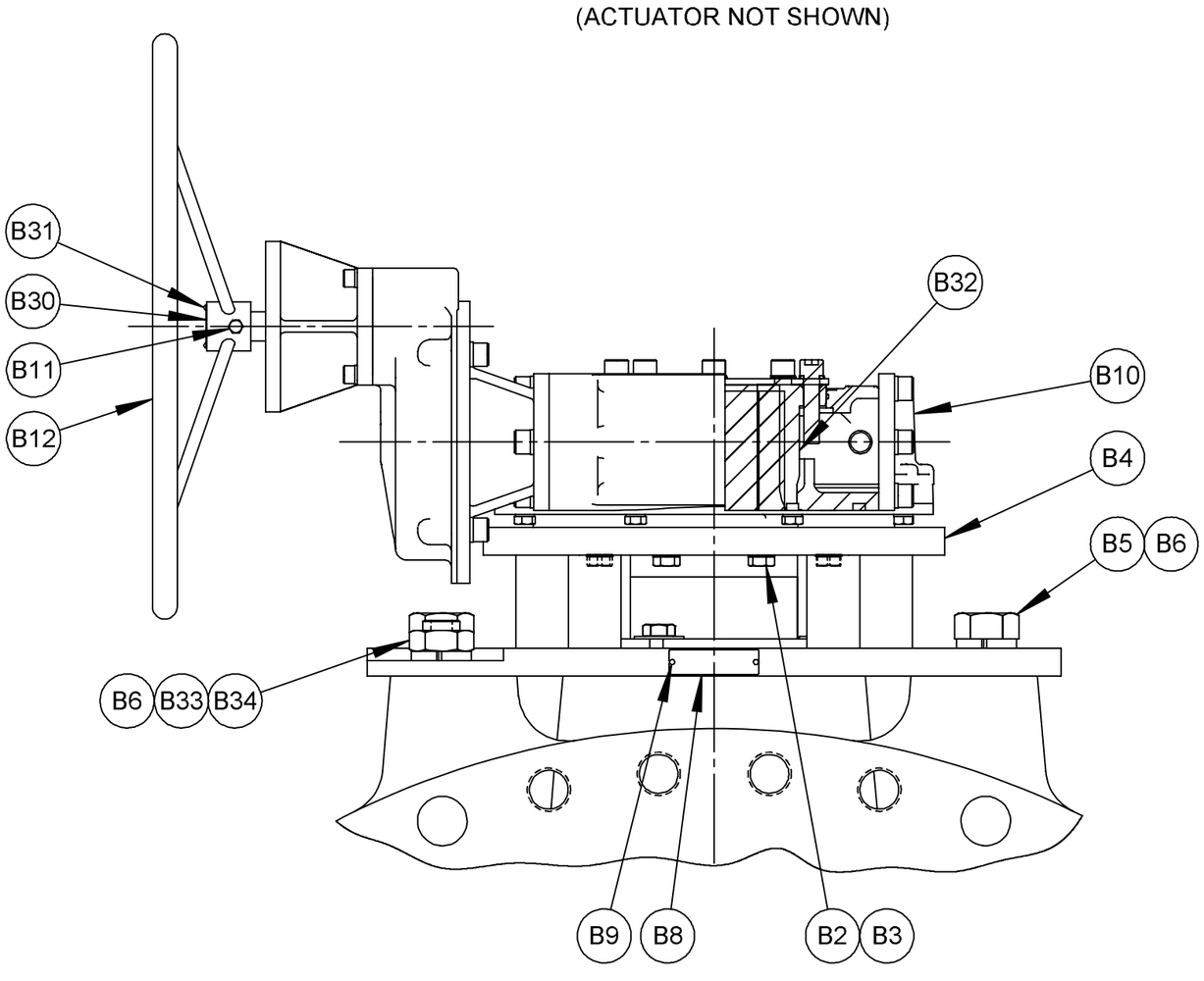
1. WHEN ORDERING PARTS, INCLUDE VALVE SIZE AND PART NUMBER FROM DATA PLATE. ALSO INCLUDE THIS DRAWING NUMBER WITH PART NAME, NUMBER AND QUANTITY.



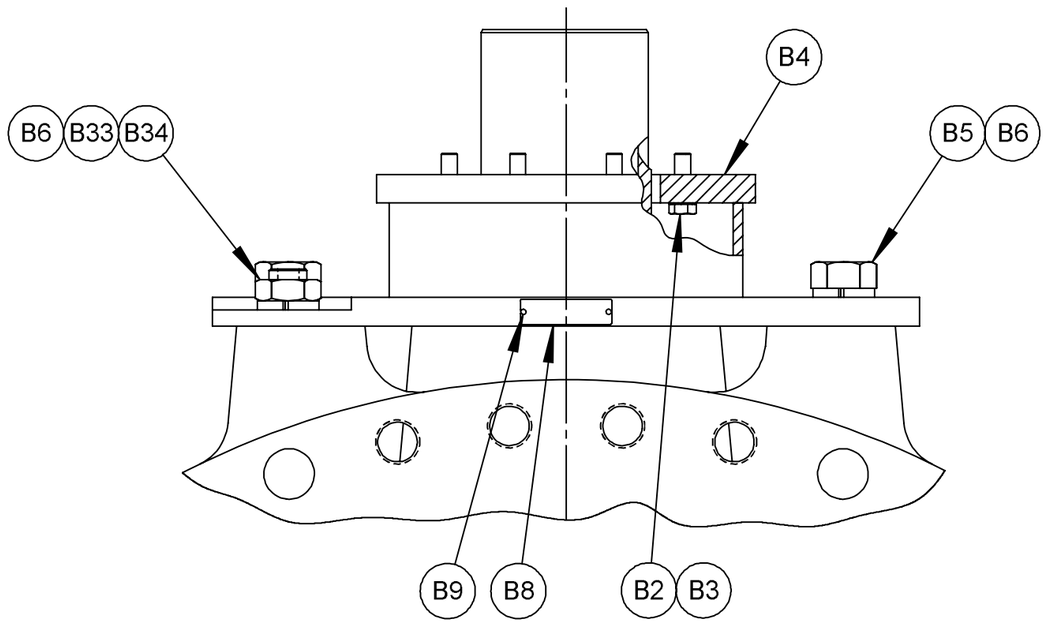
28 - 48 F2 VALVES WITH ADJUSTABLE PACKING
(ACTUATOR NOT SHOWN)



28 - 48 VALVES WITH NON-ADJUSTABLE PACKING
(ACTUATOR NOT SHOWN)



28 - 72 VALVES WITH ADJUSTABLE PACKING



54 - 72 VALVES WITH NON-ADJUSTABLE PACKING
(ACTUATOR NOT SHOWN)

G							
F	50312	06/15/18					
E	50312	07/17/17					
D	50312	06/29/17					
C	50312	06/13/17					
B	50312	04/24/17					
A	RLP	02/09/17					

DeZURIK
APCO | HILTON
www.dezurik.com

MG-WR_L & MGB-WR_L MANUAL ACTUATORS
FOR USE WITH 28 - 72 BAW BUTTERFLY VALVES

DOCT. CODE	DRAWN	APPROVED	A61281
C1	MJH	JB	
	CHECKED JB	DATE 2/9/2017	

MATERIALS OF CONSTRUCTION

DRAWING(S): A56179

WORK ORDER: 679260 **PART NO:** 9724529

DESCRIPTION: BAW,66,F1,DI,NBRN-NBR,150B,DI-S1,AIS-CMC-DTR-TB-1421D2*MGB-WR5L-HD24*BCZ264

ITEM	MATERIAL
A01	DUCTILE IRON, ASTM A536, GRADE 65-45-12, SPECTRO, CERT, USA FOUNDRY
A02	ACRYLONITRILE-BUTADIENE (NBR)
A06	DUCTILE IRON, ASTM A536, GRADE 65-45-12
A07	STAINLESS STEEL, TYPE 18-8
A08	ACRYLONITRILE-BUTADIENE (NBR)
A09	STAINLESS STEEL, TYPE 303, ASTM A582, CONDITION A
A10	STAINLESS STEEL, TYPE 18-8
A11	DUCTILE IRON, ASTM A536, GRADE 65-45-12, SPECTRO, CERT, USA FOUNDRY
A12	STAINLESS STEEL, TYPE 316, ASTM A240
A13	STAINLESS STEEL, TYPE 304, ASTM A276, CONDITION A
A14	STAINLESS STEEL, TYPE 18-8
A15	STAINLESS, WROUGHT, TYPE 304, ASTM A240/A276, CERTIFIED, USA MILL
A16	STEEL, COLD DRAWN, AISI 1018
A17	TETRAFLUOROETHYLENE (TEFLON)/DACRON FABRIC LINER, FIBERGLASS BACK-UP SHELL
A19	ACRYLONITRILE-BUTADIENE (NBR)
A22	TIN BRONZE, ASTM B505/B427, C90700
A23	STAINLESS STEEL, TYPE 18-8
A24	STAINLESS STEEL, TYPE 18-8
A25	STAINLESS, WROUGHT, TYPE 304, ASTM A240/A276, CERTIFIED, USA MILL
A26	STAINLESS STEEL, TYPE 304, ASTM A276, CONDITION A
A27	STAINLESS STEEL, TYPE 18-8
A29	STEEL, ASTM A36
A32	EPOXY CATALYST GRACE NO. 9 UNPIGMENTED
A32	EPOXY RESIN GRACE NO. 2651-40
A33	ACRYLONITRILE-BUTADIENE (NBR)
A34	STAINLESS STEEL, TYPE 18-8
A35	STAINLESS STEEL, TYPE 316

DeZURIK BAW BUTTERFLY VALVES - Manual Actuator Sizing

6/9/2022 *rev C*

Valve Description: 66" BAW **W.O.** *679260-152107*

Actuator: WR5 GEAR W/ HW **Item** 9724529

Approved By: NJV **Date:** 8/12/2022

BAW Valve Application Parameters

Valve Size (inches):	66	inch	*epoxy retained seat*
or Valve Size (mm):		mm	*1650 mm*
Maximum Pressure: (P)	30	psi	

Seat Downstream / Bi-Directional	X
Seat Upstream	
Valve Shaft: Vertical	
Horizontal	X

Flow Velocity: (V)	6.88	ft/sec
Bearing Coefficient of Friction: (f)	0.10	
Design Safety Factor: (S)	1.00	

Pressure Class: 250B	
150B	X
75B	
25A	

Actuator Parameters (from supplier)

Actuator:	*WR5*		~~*G12A*~~
Actuator Rated Output Torque: (Ta)	25,075	ft-lbs	
Maximum Rim Pull: (Fr)	80	lbs	
Actuator Mechanical Advantage: (M)	233		
Actuator Handwheel Diameter: (H)	24	in	

Calculated Valve Torque

Valve Body Size:	**66 inch**	*D = 66*
Pressure Class:	**150B**	*C = 11.0*
Bearing Torque:	*3,314 ft-lbs*	*Tb = P*D2*pi*d*f/8/12*
Seating Torque:	*3,993 ft-lbs*	*Ts = D2 * C / 12*
Hydrostatic Torque:	*2,800 ft-lbs*	$T_h = 3.06 * (D/12)^4$
Valve Operating Torque:	**10,107 ft-lbs**	$T_v = T_b + T_s + T_h$
Maximum Dynamic Torque:	**10,105 ft-lbs**	T_d = *dynamic torque*
Operating Torque with Safety Factor:	**10,107 ft-lbs**	$T_f = T_v * S$

Calculated Actuator Torque Data

Actuator Rated Output Torque:	**25075 ft-lbs**	T_a = *(from supplier)*
Calculated Actuator Safety Factor:	**2.48**	$S_a = T_a / T_{max}$
Calculated Handwheel Rim Pull:	**43 lbs**	F_i = *Tv / M / H * 24*

DeZURIK

7/7/2022

Torque Calculations for a 66" Class 150B
AWWA Butterfly Valve

Seating, Bearing and Hydrostatic Torque: 10,107 ft-lbs.
Seating and Bearing Torque: 7,307 ft-lbs.

	K		Ct		V		P		Td		Tb		Ta (Flat Side Upstream)		Ta (Flat Side Downstream)	
Degrees Open	flat side upstream	flat side downstr.	flat side upstream	flat side downstr.	flat side upstream	flat side downstr.	flat side upstream	flat side downstr.	flat side upstream	flat side downstr.	flat side upstream	flat side downstr.	Valve Closing	Valve Opening	Valve Closing	Valve Opening
10	1923.08	1424.82	-0.0008	-0.0019	1.49	1.71	28.60	28.15	-540	-1,220	3,065	3,016	4,218	3,138	4,839	2,399
15	534.36	791.41	-0.0022	0.0072	2.66	2.24	25.52	26.82	-1,280	4,413	2,734	2,874	4,561	2,001	-965	7,862
20	246.32	374.95	-0.0037	0.0084	3.62	3.08	21.73	24.00	-1,847	4,620	2,328	2,572	4,641	946	-1,534	7,706
25	127.59	151.84	-0.0053	0.0179	4.49	4.26	17.29	18.55	-2,082	7,601	1,853	1,987	4,305	141	-5,216	9,986
30	73.43	85.23	-0.0051	0.0253	5.16	4.99	13.17	14.29	-1,546	8,268	1,411	1,531	3,240	148	-6,431	10,105
35	51.14	45.72	-0.0003	0.0330	5.55	5.65	10.59	9.83	-82	7,431	1,134	1,054	1,443	1,279	-6,167	8,696
40	25.46	23.82	0.0049	0.0443	6.11	6.16	6.40	6.08	723	6,170	686	651	101	1,546	-5,388	6,951
45	15.52	12.78	0.0130	0.0591	6.39	6.47	4.26	3.60	1,269	4,871	456	386	-722	1,817	-4,408	5,334
50	10.22	7.85	0.0276	0.0787	6.55	6.62	2.95	2.32	1,866	4,180	316	249	-1,487	2,245	-3,881	4,478
55	6.02	5.00	0.0441	0.1108	6.68	6.72	1.81	1.52	1,830	3,852	194	163	-1,597	2,063	-3,657	4,047
60	3.70	3.12	0.0704	0.1388	6.76	6.78	1.14	0.97	1,837	3,075	122	104	-1,690	1,983	-2,951	3,200
65	2.62	2.09	0.1035	0.1784	6.80	6.82	0.81	0.65	1,932	2,672	87	70	-1,827	2,037	-2,588	2,756
70	1.44	1.39	0.1615	0.2372	6.84	6.84	0.45	0.44	1,672	2,383	48	47	-1,614	1,730	-2,327	2,440
75	0.90	0.93	0.2027	0.2986	6.86	6.86	0.28	0.30	1,319	2,024	30	32	-1,283	1,356	-1,986	2,062
80	0.64	0.61	0.2130	0.3687	6.87	6.87	0.20	0.19	990	1,643	22	21	-964	1,017	-1,618	1,668
85	0.40	0.45	0.0952	0.3509	6.88	6.88	0.13	0.14	278	1,141	14	15	-262	295	-1,123	1,159
90	0.36	0.41	-0.1008	0.1855	6.88	6.88	0.11	0.13	-265	549	12	14	280	-250	-533	566
												Absolute Value of Maximum Torque:	4,641	3,138	6,431	10,105

Input Variables		
Class= 150B	<--	Valve pressure class
D = 66"	<--	Valve nominal diameter
d = 7.750"	<--	Stem diameter
f = 0.1	<--	Bearing friction coefficient
Vi = 6.88 fps	<--	Inlet Fluid Velocity
HT = 30 psi	<--	Upstream Pressure
TR = 1	<--	Turbulence factor
Q = 73,381	<--	Gallons per minute

Legend	
K =	Resistance coefficient (K-factor)
Ct =	Coefficient of Dynamic Torque
V =	Velocity (feet per second)
P =	Pressure drop across valve (PSI)
Td =	Dynamic torque (foot-pounds)
Tb =	Bearing torque (foot-pounds)
Ta =	Required actuator torque per Appendix A - AWWA C504 (foot-pounds)

BAWTORQ6

DeZURIK

7/7/2022

Shaft Stress Calculations for a ***66"*** ***Class 150B***
AWWA Butterfly Valve

Flow Velocity: **6.88 fps**
Maximum Pressure: **30 psi**

Torque (ft-lbs)	Shear due to torsion	Direct Shear	Bending Stress	Combined Shear	Combined shear due to bending and torsion	Combined tensile due to bending and torsion	Degrees Open	Shear due to torsion	Direct Shear	Bending Stress	Combined Shear	Combined shear due to bending and torsion	Combined tensile due to bending and torsion	Torque (ft-lbs)
Flow Toward Flat Side								Flow Toward Domed Side						
10,107	1,109	1,450	1,179	2,560	1,256	1,846	0	1,109	1,088	1,179	2,197	1,256	1,846	10,107
7,307	742	1,450	1,179	2,192	948	1,537	0	742	1,088	1,179	1,830	948	1,537	7,307
4,218	71	1,037	1,124	1,108	567	1,129	10	160	1,021	1,106	1,181	576	1,129	4,839
4,561	168	925	1,003	1,093	529	1,030	15	579	973	1,054	1,552	783	1,310	7,862
4,641	243	788	854	1,030	491	918	20	607	870	943	1,477	768	1,240	7,706
4,305	273	627	680	900	436	776	25	998	673	729	1,671	1,062	1,427	9,986
3,240	203	478	518	681	329	588	30	1,086	518	562	1,604	1,121	1,402	10,105
1,443	11	384	416	395	208	416	35	976	357	387	1,332	995	1,188	8,696
1,546	95	232	252	327	158	283	40	810	220	239	1,030	819	938	6,951
1,817	167	154	167	321	187	270	45	639	131	141	770	643	714	5,334
2,245	245	107	116	352	252	310	50	549	84	91	633	551	596	4,478
2,063	240	66	71	306	243	278	55	506	55	60	561	507	536	4,047
1,983	241	41	45	282	242	265	60	404	35	38	439	404	423	3,200
2,037	254	30	32	283	254	270	65	351	24	26	374	351	364	2,756
1,730	220	16	18	236	220	229	70	313	16	17	329	313	322	2,440
1,356	173	10	11	183	173	179	75	266	11	12	276	266	272	2,062
1,017	130	7	8	137	130	134	80	216	7	8	223	216	220	1,668
295	37	5	5	41	37	39	85	150	5	6	155	150	153	1,159
280	35	4	5	39	35	37	90	72	5	5	77	72	75	566
	Maximum Stresses							**Maximum Stresses**						
	1,109	1,450	1,179	2,560	1,256	1,846		1,109	1,088	1,179	2,197	1,256	1,846	

BAWTORQ6

Blue Epoxy DeZURIK	Two-part epoxy conforms to NSF/ANSI 372, AWWA C550, and AWWA C210. Self-priming system with each coat consisting of 4-8 mils dry film thickness. Surface preparation to SP10. Standard for all DeZURIK Valves.
Aluminum (High Temp.)	A high-heat silicone aluminum for protection against weather, moisture, heat and industrial fumes to high temperature applications. Coating thickness 1-2 mils. Surface preparation to SP10.
Tnemec Series141 Pota-Pox 80	Two-part epoxy conforms to NSF 61, AWWA C550, and AWWA C210. Self-priming system with each coat consisting of 4-8 mils dry film thickness. Surface preparation to SP10.
Coal Tar Epoxy (Tnemec Series 46H-413)	Two-part epoxy, conforms to AWWA C210. Self-priming system. 16 mils dry film thickness recommended or 8 mils for two-coat option. Minimum surface preparation to SSPC-SP10.
Fusion Bonded Epoxy	Fusion Bonded Epoxy Powder Coating conforms to NSF/ANSI 61 and AWWA C550. Coating thickness 12 mils. Minimum surface preparation to SSPC-SP10.

SURFACE PREPARATION

SSPC - SP5: White blast Cleaning

SSPC - SP10: Near - White Blast Cleaning

FUNCTIONAL SPECIFICATIONS

NSF Requirement	NSF/ANSI 61/372 are the standards stipulating allowable lead content in components that are in contact with potable water. DeZURIK standard blue epoxy coating meets the requirements of these standards.
VOC Limits	EPA regulations require a limit on the volatile organic compounds (VOC) to 3.5 pounds per gallon. Some States may require lower levels. i.e. California requires 2.8 pounds per gallon.
Paint Compatibility	Some over coats are not compatible with the standard DeZURIK base coats. When in doubt, contact factory.
Finish Coat Requirements	Some projects require the valves to be painted after installation. These valves do not need finish coats from the factory. Be sure that the product is not over specified at order entry.
Color Requirements	Projects require special colors. Be sure to include color requirement on the order.

Maximum Coating Thickness	Coating thickness varies with the various paint manufacturers. Coating thickness may be increased by the application of a second or third coat. Typically, a 15-mil coating is considered a practical maximum. Some coatings actually lose performance parameters as the thickness is increased beyond the manufacturer's recommendation.
Holiday Testing	Holiday testing is a process using a dielectric device to detect voids in an epoxy coating. ~~NOTE: THIS IS PERFORMED AT AN ADDITIONAL CHARGE TO THE COATING PRICE.~~

OTHER PAINTING SYSTEMS

Fusion Bonded Epoxy	Fusion Bonded Epoxy is a one-part heat curable semi-rigid thermosetting powdered coating. It is available on a special basis.
Two Part Epoxies	A two-part system consists of a base material and a catalyzing or hardening agent to cure the coating. Coating cure may take place in air or accelerated by oven heating.
Three Part Zinc Primer	An inorganic coating consisting of three elements: base, filler powder and catalyst. This system is expensive, very difficult to work with, requires long cure times, and is very sensitive to surface prep and recoating.

APPLICATION

DeZURIK	Stainless steel, bronze, aluminum or nickel alloy valves are not painted. Stainless steel or plated components will not be painted. Purchased accessories will not be painted. Purchased pneumatic, hydraulic and electric actuators will only have the manufacturer's coating. All DeZURIK actuators will be painted. Tubing and fittings will not be painted. Pinned extension pipes will not be painted that have galvanized, black oxide or varnish coatings.

EPOXY PAINT SPECIFICATION
TNEMEC SERIES 141

DeZURIK
APCO | HILTON

APPLICATION DATA 10.02-7
Page 1
April, 2015
Supersedes March, 2014

Name:	Tnemec Series 141 EPOXOLINE Epoxy
Material:	Modified Polyamine Epoxy, Conforms to NSF 61 Standards, AWWA C550, AWWA C210
Colors:	White, Beige, Red, Blue
Application:	Spray as is
% Solids by Volume:	80 % Mixed
Theoretical Coverages:	1,283 mil sq. ft. per gallon
Air Drying Time @ 75°F (24° C):	
Handling:	4 hours
To Recoat:	5 hours
Immersion Service:	7 days
VOC:	1.3 lbs./gal.
Minimum Surface Prep:	SSPC-SP-10
Performance Criteria:	This product will meet or exceed the following test requirements established for the coating system listed:

Abrasion	Method:	ASTM D 4060 CS-17 Wheel, 1000 grams load
Adhesion	Method:	ASTM D 4541 900 PSI pull ASTM D 3359 Cross Hatch
Salt Spray (Fog)	Method:	ASTM B 117
Fresh Water	Method:	Constant immersion in tap water at 75°F (24°C), no blistering or delamination after 1 year immersion

DeZURIK Standard Thickness:	4 - 8 Mils

AWWA BUTTERFLY VALVES (BAW)
TEST SPECIFICATION

DeZURIK
APCO | HILTON

APPLICATION DATA 43.01-4
Page 1
July, 2012
Supersedes April, 2012

SHELL TEST

VALVE SIZE	DURATION	TEST PRESSURE - WATER, psi / kPa				
		PRESSURE CLASS				
		25 / 170	**75 / 520**	**150 / 1030**	**200 / 1380**	**250 / 1720**
3 - 8" / 80 - 200mm	1Minute	50 / 340	150 / 1030	300 / 2070	400 / 2760	500 / 3450
10 - 20" / 250 - 500mm	3 Minutes					
→ 24 - 120" / 600 - 3000mm	10 Minutes					

SEAT TEST

VALVE SIZE	DURATION	TEST PRESSURE - WATER, psi / kPa				
		PRESSURE CLASS				
		25 / 170	**75 / 520**	**150 / 1030**	**200 / 1380**	**250 / 1720**
3 - 20" / 80 - 500mm	5 Minutes	25 / 170	75 / 520	150 / 1030	200 / 1380	250 / 1720
→ 24 - 120" / 600 - 3000mm	10 Minutes					

Water Quality Association
Gold Seal Certificate

DeZURIK, INC.

250 Riverside Ave. North
Sartell, MN United States

Facility: DeZURIK, INC.

Certification Date: September 29, 2021

Authorized By: Caren L. Settler

Caren L. Settler
Process Improvement Manager

Water Quality Association
2375 Cabot Drive
Lisle, IL 60532, USA

#0633
ISO/IEC 17065
Product Certification Body

Products are evaluated according to Product Certification Scheme Type 5, as defined in ISO/IEC 17067 (current version).
This Certificate, or any part thereof, may not be used in a misleading manner and validation of its use is contingent upon the Official WQA web-listing.
Please contact your Project Leader for product expiration terms. All Standards referenced in the Product Certification Schemes by Standard Name.

Revision: 03/01/2021

FORM.12046

Water Quality Association Official Gold Seal Listing

Granted to the following company:	DeZURIK, INC. 250 Riverside Ave. North Sartell, MN 56377 United States
For the Facility Located at:	DeZURIK, INC. 250 Riverside Ave., North Sartell, MN 56377 United States

The WQA Gold Seal Certification Department has issued certification for the following model(s) to the standard(s) below. Only models that appear in the official listing are authorized to bear the WQA Gold Seal.

NSF/ANSI/CAN 61 - 2018: Drinking Water System Components - Health Effects

BAW Butterfly Valves	DeZURIK BOS CL Resilient-Seated Butterfly Valves	DeZURIK BOS US Resilient-Seated Butterfly Valves
DeZURIK CSD,800	DeZURIK VBL Ball Valve	

NSF/ANSI 372 - 2016: Drinking Water System Components - Lead Content

BAW Butterfly Valves	DeZURIK BOS CL Resilient-Seated Butterfly Valves	DeZURIK BOS US Resilient-Seated Butterfly Valves
DeZURIK CSD,800	DeZURIK VBL Ball Valve	

Notice: To request any changes to the certified model(s), please request a Change to Certified Product (CCP) form. Examples include any change to the wetted parts or formulations such as supplier or material types, literature, or a change in company name. This list is not all inclusive. Failure to submit documentation regarding changes may result in non-compliance with the standard(s) as well as de-listing of the affected models.

rotork®

Keeping the World Flowing

IW Series **AWWA**

C504 and C517 Part-turn Worm Gear Operator

The IW AWWA worm gear operators are suitable for manual actuation of AWWA C504 butterfly and C517 plug valves.

The range has been designed and comprehensively tested to meet or exceed all aspects of the AWWA C504 & C517 specifications, and are manufactured from high quality and reliable materials.

The range includes a gear design for inherent self-locking capability. Test reports are available upon request. All Rotork Gears actuators are made to ISO 9001 standards.

Features

- 90% grease filled for life and fully sealed
- Comprehensive gear ratios combined with a selection of input gear reducers
- Angular contact bearings supporting the worm shaft
- Removable and repositionable drive sleeve
- Self-lubricated drive sleeve
- -40 to 250 °F standard temperature range
- Adjustable travel stops +/- 5 degrees
- Maximum rated output torque - 1.45 million in-lbs
- Maximum stem acceptance diameter - 12" bored with ANSI B17.1 square key
- Above or buried service
- IP68

Options

- Stem extensions
- Padlock kit
- NAMUR & Westlock position indicator mounting kit
- High temperature to +392 °F
- Low temperature to -76 °F
- 2" square nut
- 450 ft-lbs Service
- Mitre box (IB2 for FA10 mounting or IB4 for FA14 mounting) available for buried service applications.

Sizing Chart for AWWA C504-15 & C517-16 with 300 ft lbs Overload Capacity

Unit Size	Ratio	Turns to close	MA ±10%*	Max H/W dia inch	Max handwheel output torque in lbs	Max handwheel output torque ft lbs	Max wrench nut torque in lbs	Max wrench nut torque ft lbs	Rated output torque in lbs	Rated output torque ft lbs	Approx Weight lbs
IW5	48	12	16	48	30720	2560	28800	2400	45139	3762	100
IW5	96	24	30	36	43200	3600	45139	3762	45139	3762	115
IW55	96	24	30	48	58394	4866	54744	4562	59034	4920	115
IW55	144	36	46	36	59034	4920	59034	4920	59034	4920	115
IW6	76	19	25	48	48815	4068	45764	3814	106740	8895	150
IW6	228	57	72	36	104342	8695	106740	8895	106740	8895	175
IW7	384	96	120	36	172872	14406	177000	14750	177000	14750	335
IW8	768	192	233	36	300900	25075	300900	25075	300900	25075	490
IW9	1044	261	342	36	492480	41040	562021	46835	562021	46835	640
IW10	1332	333	391	36	563328	46944	668880	55740	668880	55740	900
IW11	1946	487	626	48	1126256	93855	1126256	93855	1126256	93855	1285
IW12	2374	594	796	48	1451520	120960	1432031	119336	1451520	120960	2575

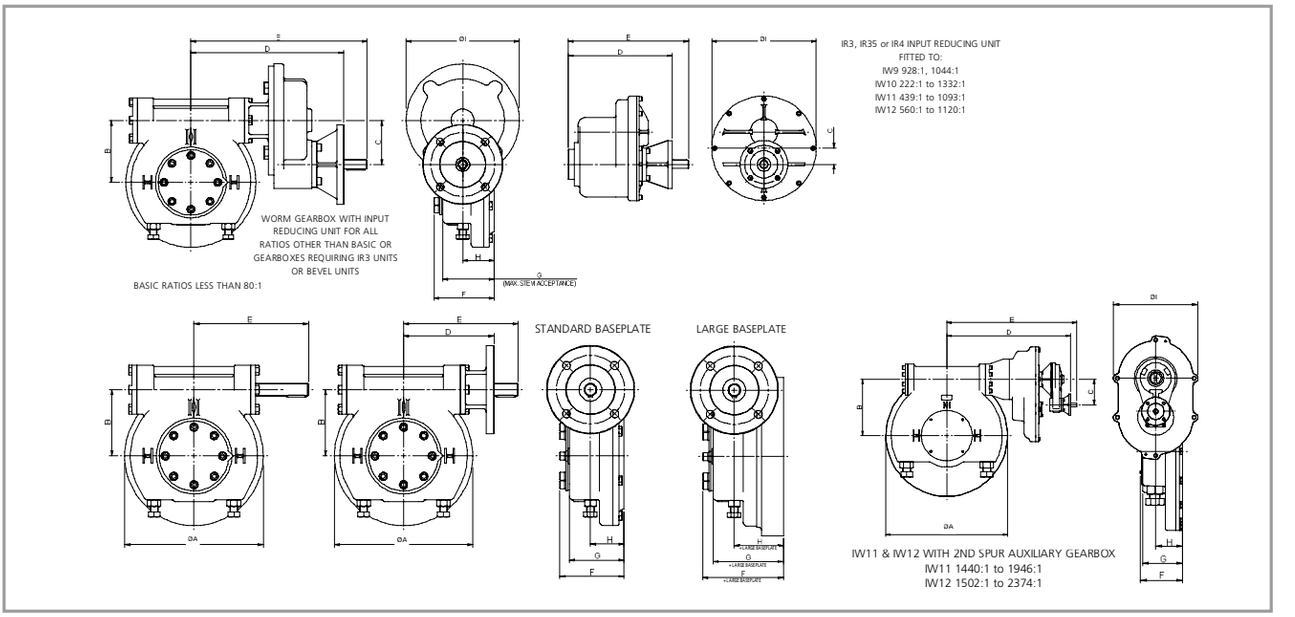
Sizing Chart for AWWA C504-15 & C517-16 with 450 ft lbs Overload Capacity

Unit Size	Ratio	Turns to close	MA ±10%*	Max H/W dia inch	Max handwheel output torque in lbs	Max handwheel output torque ft lbs	Max wrench nut torque in lbs	Max wrench nut torque ft lbs	Rated output torque in lbs	Rated output torque ft lbs	Approx Weight lbs
IW5	48	12	16	48	30720	2560	28800	2400	45139	3762	100
IW5	96	24	30	36	43200	3600	45139	3762	45139	3762	115
IW55	96	24	30	48	58394	4866	54744	4562	59034	4920	115
IW55	144	36	46	36	59034	4920	59034	4920	59034	4920	115
IW6	76	19	25	48	48815	4068	45764	3814	106740	8895	150
IW6	152	38	48	48	92749	7729	86952	7246	106740	8895	175
IW7	256	64	80	48	153664	12805	144060	12005	177000	14750	335
IW8	512	128	155	48	298240	24853	279600	23300	300900	25075	490
IW9	696	174	228	48	437760	36480	410400	34200	562021	46835	575
IW10	888	222	261	48	500736	41728	469440	39120	668880	55740	900
IW11	1663	416	535	48	1027200	85600	963000	80250	1126256	93855	1285
IW12	2374	594	796	48	1451520	120960	1432031	119336	1451520	120960	2575

*The published M.A. is achieved after a few cycles. Other ratios are available.

Mounting Options

Gearbox	Max Bore ANSI B17.1 Key		Max Square Bore AF	MSS Flange Baseplate	Additional Baseplate Thickness	Max Stem Height
	Square	Rectangular				
IW5 / IW55	2.75	3	2.375	FA14 - FA16	0	4.48
IW5 / IW55 LB	2.75	3	2.375	FA25	1.42	5.75
IW6	3.75	3.875	3.25	FA16 - FA25	0	4.45
IW6 LB	3.75	3.875	3.25	FA30	0.91	5.35
IW7	4.875	5.25	4.25	FA25 - FA30	0	5.51
IW7 LB	4.875	5.25	4.25	FA35	1.22	6.73
IW8	5.625	6	4.75	FA25 - FA30 - FA35 - FA40	0	6.30
IW8 LB	5.625	6	4.75	FA40 - FA48	1.49	7.80
IW9	6.5	6.5	5.125	FA30 - FA35 - FA40	0	6.62
IW9 LB	6.5	6.5	5.125	FA40 - FA48	1.06	7.70
IW10	7.375	7.625	6	FA35 - FA40 - FA48	0	7.10
IW10 LB	7.375	7.625	6	FA60	1.26	8.35
IW11	7.375	7.625	6	FA35 - FA40 - FA48	0	7.87
IW11BB	9.875	10.125	7.5	FA40 - FA48	0	7.87
IW11BB LB	9.875	10.125	7.5	FA60	0	7.87
IW12	9.5	10.25	7	FA40 - FA48 - FA60	0	9.88
IW12 (12" Baseplate)	11.75	12	9	FA48 - FA60	0	9.88



Dimensions and Weights

Gearbox	Ratio	ØA	B	C	D	E	F	G	H	ØI	Weight (lb)
IW5 / IW55	48, 96	11.22	5.35		7.32	9.29	5.20	4.49	2.72		100 / 115
IW5 / IW55	96, 144	11.22	5.35	2.52	12.32	14.33	5.20	4.49	2.72	7.48	115
IW6	76	14.76	7.01		7.32 (7.72 for FA10)	9.29	5.47	4.45	2.76		150
IW6	152, 228	14.76	7.01	2.52	12.32	14.33	5.47	4.45	2.76	7.48	175
IW7	64 to 384	17.72	8.27	4.69*	18.11*	20.51*	6.73	5.51	3.39	11.42*	335*
IW8	64 to 768	20.47	9.69	7.05*	19.88*	22.28*	7.56	6.30	3.90	16.06*	490*
IW9	58 to 1044	23.46	10.98	7.05*	23.82*	26.22*	7.87	6.61	3.90	16.06*	640*
IW10	74 to 1332	28.94	13.50	2.32*	24.84*	27.24*	8.50	7.09	4.33	15.04	900*
IW11 / IW11BB WITH 2ND SPUR AUXILIARY	73 to 1946	31.30	15.00	8.03*	30.98*	32.95*	9.72	7.87	4.72	15.04	1285*
IW12 WITH 2ND SPUR AUXILIARY	70 to 2374	38.27	17.72	8.03*	38.94*	40.91*	10.24	9.88	6.54	20.47	2575*

All dimensions in inches.
*Values listed are maximums and are subject to change based on gearbox configuration and options.

rotork®

Keeping the World Flowing

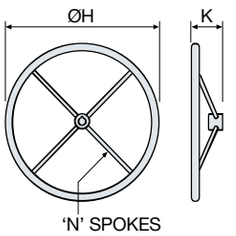
IW Series AWWA

C504 and C517 Part-turn
Worm Gear Operator

Material Specification

Component	Material	Specification / Notes
Gearcase	Ductile Iron	ASTM A536 65-45-12
Baseplate	Cast Iron	ASTM A48 35B/40B
Worm Shaft	Steel	ASTM A29 4140
Quadrant	Ductile Iron (Manganese Bronze for IW55)	ASTM A536 100-70-03 (ASTM B584 UNS C86300)
Position Indicator	Steel	AISI 1023
Drive sleeve	Steel	AISI 1023, AISI 1040 or AISI 1055 (All with self-lubricating surface treatment)
Bearings	Steel	Angular Contact
O-Ring seals	Nitrile	
Fasteners	Stainless Steel	ASTM A276 316
Grease	Renolit CL-X2	
Input Shaft	Stainless Steel	ASTM A276 431

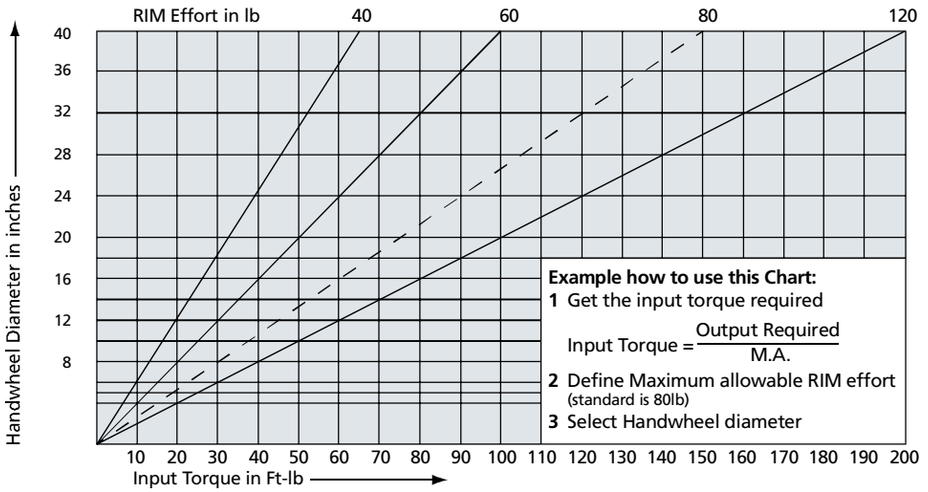
Handwheel Selection Chart



'F' Type handwheel

Dimensions

Type	ØH	K	N
F200	8	2.97	3
F300	12	3.96	3
F400	16	3.96	4
F500	20	3.96	4
F600	24	3.96	4
F700	28	3.96	6
F800	32	3.96	6
F900	36	3.96	6
F1000	40	3.96	6
F1100	44	3.96	6
F1200	48	3.96	8



A full listing of the Rotork sales and service network is available on our website.

www.rotork.com

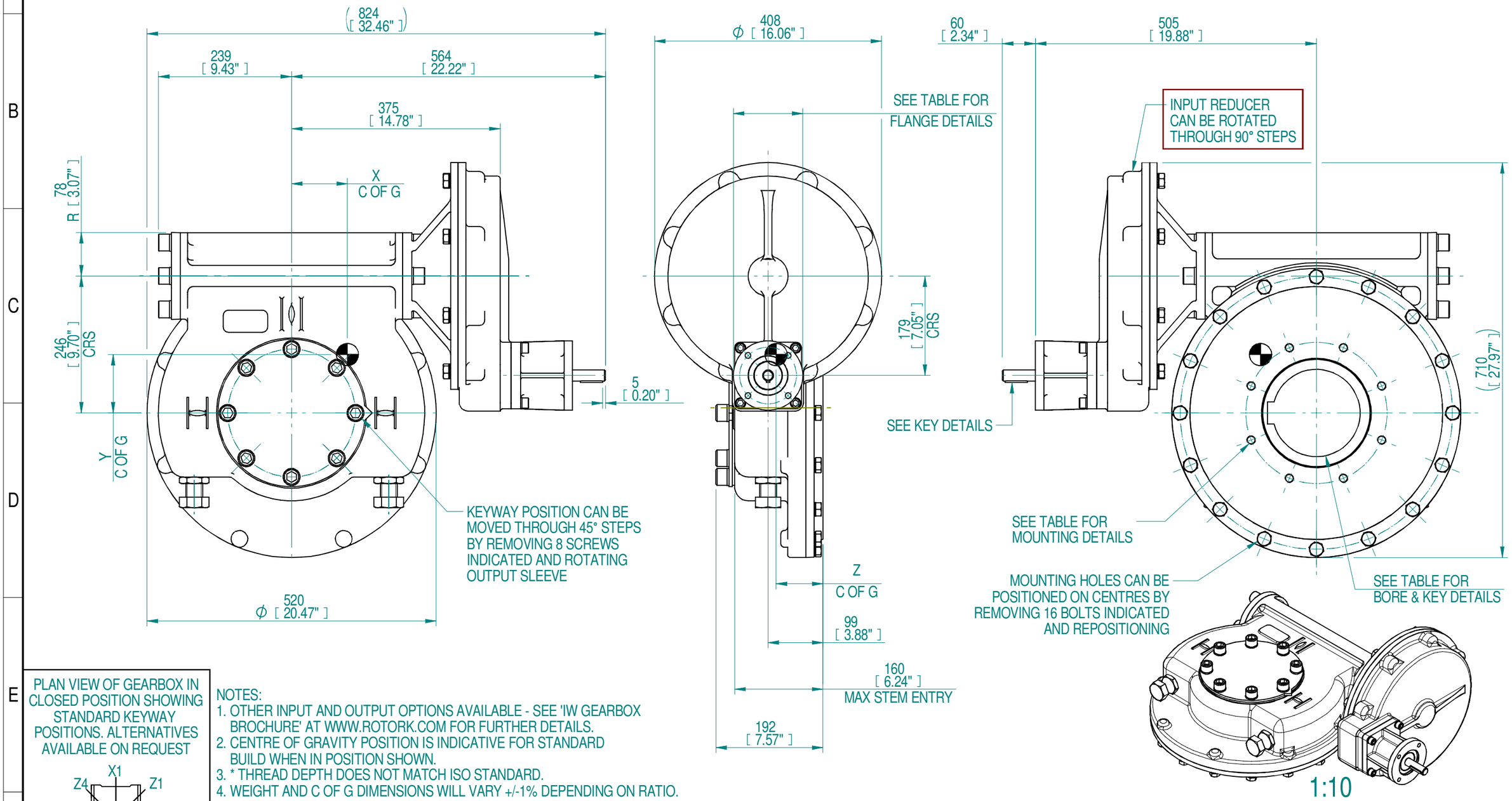
Rotork Gears UK
tel +44 (0)113 256 7922
email sales@rotorkgears.com

Corporate Headquarters
Rotork plc
tel +44 (0)1225 733200
fax +44 (0)1225 333467
email mail@rotork.com

Electric Actuators and Control Systems
Fluid Power Actuators and Control Systems
Gearboxes and Gear Operators
Precision Control and Indication
Projects, Services and Retrofit

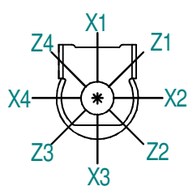
PUB028-003-00
Issue 08/19

INPUT FLANGE DETAILS							MOUNTING HOLES - BOLT CIRCLE (OFF CENTRES)				STEM ACCEPTANCE IN ACCORDANCE TO STANDARD						
INPUT FLANGE	FLANGE O/DIA.	SHAFT DIA.	RECESS DIA.	RECESS DEPTH	HOLE DETAILS (OFF CENTRES)	KEY DETAILS	ISO 5211 / MSS SP-101 MOUNTING OPTION	HOLE DETAILS (OFF CENTRES)	MAX OUTSIDE DIA. INCLUDING DRILLED HOLES	MIN INSIDE DIA. INCLUDING DRILLED HOLES	SQ BORE MAX	STANDARD	MIN BORE	SQ KEY MAX BORE	SQ KEY SIZE	RECT. KEY MAX BORE	RECT KEY SIZE
ISO F10	Ø125 x 15 (Ø4.92" x 0.590")	Ø20.00-0.05 (Ø0.787"-0.002")	Ø70.05+0.15 (Ø2.758"+0.006")	4 (0.16")	4 x Ø10.5 ON Ø102.0 P.C. (4 x Ø0.41" ON Ø4.02" P.C.)	6x6x40 (0.24"x0.24"x1.57")	ISO F25*	8 x M16 x 24 (0.94") DEEP ON Ø254.0 (Ø10.00") P.C.	Ø418 (16.46")	Ø222 (8.74")	□ 122.9 (4.84")	BS4235	-	-	-	157	40 x 22
												BS46	-	5.625"	1 1/2" SQ.	6.00"	1 1/2" x 1"
FA10			Ø58.70+0.15 (Ø2.311"+0.006")				FA25*	8 x 5/8" UNC x 24 (0.94") DEEP ON Ø254.0 (Ø10.00") P.C.				ANSI B17.1	-	5.625"	1 1/2" SQ.	6.00"	1 1/2" x 1"
												DIN 6885	-	-	-	157	40 x 22



1:10

PLAN VIEW OF GEARBOX IN CLOSED POSITION SHOWING STANDARD KEYWAY POSITIONS. ALTERNATIVES AVAILABLE ON REQUEST



NOTES:
1. OTHER INPUT AND OUTPUT OPTIONS AVAILABLE - SEE 'IW GEARBOX BROCHURE' AT WWW.ROTORK.COM FOR FURTHER DETAILS.
2. CENTRE OF GRAVITY POSITION IS INDICATIVE FOR STANDARD BUILD WHEN IN POSITION SHOWN.
3. * THREAD DEPTH DOES NOT MATCH ISO STANDARD.
4. WEIGHT AND C OF G DIMENSIONS WILL VARY +/-1% DEPENDING ON RATIO.

768	192	233	221	44500	191	100	105	84
572	143	174			256			
505	126	153			290			
RATIO	TURNS TO CLOSE	M.A. (±10%)	WEIGHT (KG)	MAX OUTPUT (Nm)	MAX INPUT (Nm)	X	Y	Z
DESCRIPTION				TORQUE		CENTRE OF GRAVITY		

Rev	ECN	Revised	Rev. Approved	Date	Change Description
0-1		J.Dickinson	J.Dickinson	2019-11-12	Include secondary units

rotork® Gears
Leeds - UK
www.rotork.com

Dimensions in mm
Scale 1:7

Title **IW86 IR2L QUARTER TURN GEARBOX**

FOR INFORMATION ONLY

Created	S.Monish	2019-09-25
Checked	V.G.Balaji	2019-10-09
Approved	J.Dickinson	2019-11-08

Drawing Number **PUB-IW86-IR2L** Rev 0-1

Nominal Mass **SEE TABLE** Size A3 Sheet 1 of 1

Template issue : 2018-05-10

21st October 2016

Certificate of Compliance
AWWA Standard for Rubber-Seated Butterfly Valves C504-15
AWWA Standard for Resilient-Seated Cast Iron Eccentric Plug Valves C517-09
Manual Valve Actuators – Summary Sheet

Actuator Type:	IW5 (Bronze Gearing)
Max Rated Torque:	4920 lbft
Ratios:	144:1, 120:1, 96:1, 80:1, 48:1
Max handwheel size:	36 inches, 144:1 and 120:1; 48 inches, 96:1 and below
Test Report Reference:	T715, T729, T776, T2104, and T2107
Design File Reference:	AWWA C504-15 & C517-09, IW5 144:1, IW5 120:1
Date of issue:	13th July 2016

Actuator Type:	IW6
Max Rated Torque:	8895 lbft
Ratios:	228:1 and below
Max handwheel size:	36 inches, 228:1; 48 inches, 152:1 and below
Test Report Reference:	T2232, T2233 and T2234
Design File Reference:	AWWA C504-15 and C517-09, IW6 228:1
Date of issue:	15th March 2016

Actuator Type:	IW7
Max Rated Torque:	14750 lbft
Ratios:	384:1 and below
Max handwheel size:	36 inches, 384:1; 48 inches 256:1 and below
Test Report Reference:	T2235, T2236 and T2274
Design File Reference:	AWWA C504-15 and C517-09, IW7 384:1
Date of issue:	16th March 2016

Actuator Type:	IW8
Max Rated Torque:	25075 lbft
Ratios:	768:1 and below
Max handwheel size:	36 inches, 768:1 and 576:1; 48 inches 512:1 and below
Test Report Reference:	T2239, T2240 and T2286
Design File Reference:	AWWA C504-15 and C517-09, IW8 768:1
Date of issue:	20th April 2016

Actuator Type:	IW9
Max Rated Torque:	46835 lbft
Ratios:	1044:1 and below
Max handwheel size:	36 inches, 1044:1; 48 inches 928:1 and below
Test Report Reference:	T2241, T2307 and T2308
Design File Reference:	AWWA C504-15 and C517-09, IW9 1044:1
Date of issue:	12th July 2016

Actuator Type:	IW10
Max Rated Torque:	55740 lbft
Ratios:	1332:1 and below
Max handwheel size:	36 inches, 1332:1; 48 inches, 1184:1 and below
Test Report Reference:	T2245, T2246 and T2247
Design File Reference:	AWWA C504-15 and C517-09, IW10 1332:1
Date of issue:	20th April 2016

Actuator Type:	IW11
Max Rated Torque:	93855 lbft
Ratios:	1752:1 and below
Max handwheel size:	48 inches
Test Report Reference:	T2246, T2247 and T2358
Design File Reference:	AWWA C504-15 and C517-09, IW11 1752:1
Date of issue:	22nd August 2016

Actuator Type:	IW12
Max Rated Torque:	120960 lbft
Ratios:	2374:1 and below
Max handwheel size:	48 inches
Test Report Reference:	T2246, T2249 and T2250
Design File Reference:	AWWA C504-15 and C517-09, IW12 2374:1
Date of issue:	20th April 2016

rotork
Gears

GEARBOX TYPE PERFORMANCE CERTIFICATE

IW RANGE: IP68 sealing

IP68 TEST RECORD

TEST NO	T 1265	PASS / FAIL	Pass
GEARBOX SIZE	IW 6 / IR 1	TEST ENGINEER	H Block
GEARBOX RATIO	140:1	DATE	1 April 2010
GEARBOX RATING	9274 Nm	INPUT SPEED	Hand wound
WORM WHEEL MATERIAL	SNG 700-2	WORM SHAFT MATERIAL	Standard
THRUST BEARING TYPE	Romania	LUBRICATION	CL 2X (Lightly lubricated only)

PURPOSE OF TEST To confirm that an range IW gearbox to latest standard build stays leak free when operating 15 meters under water.

SPECIAL REQUIREMENTS The IW6 gearbox is placed inside a hyperbaric test chamber, which is pressurised to 1.5 bar (21.75 Psi) for 72 hours (3 days). The gearbox is loaded onto both stop bolts at full rated output torque of 9274 Nm for 3 cycles at this pressure each day. Input torque required is 211 Nm.

EQUIPMENT USED IP 68 Hyperbaric test rig TR 169.
Norbar SL3 torque wrench.

RESULTS OF TEST Test started on the 29th. March at 1 pm and finished on the 1st April 2010. No water entered the gearbox cavities during testing.

CONCLUSION This test verifies that the IW range of gearboxes is sealed to IP68 at a depth of 15m for a duration of 72 hours.

Signed

Steve Watkins
R+D Engineering Manager

11 June 2010

RECOMMENDED LONG & SHORT TERM STORAGE PROCEDURES

LONG TERM STORAGE (6 MONTHS +)

1. All valves shall be stored in the position in which they were shipped.

2. Valves shall be stored fully enclosed in a crate or on a skid. It is acceptable to store the valves uncrated but protected from any dirt, debris or UV exposure as long as the environmental conditions as described in item 3 are met. Any desiccant packages received with the original shipment should be replaced before putting valves into long term storage. Please follow your desiccant manufacturer's recommended usage of any desiccant based on the volume of the enclosed area.

3. Valves shall be stored in a well ventilated, clean, dry indoor facility on skids or raised racks with temperatures ranging from 35°F to 95°F (2°C to 35°C) with humidity levels not exceeding 50%.

4. If the above conditions cannot be met, valves shall be separately packaged inside sealed heavy duty plastic sheeting and a weather resistant enclosure, or a standard crate lined with moisture proof paper, to protect the valves from dirt, debris and UV exposure. Desiccant packages shall be used to control moisture both inside the enclosure and the sealed heavy duty plastic covering. Please follow your desiccant manufacturer's recommended usage of any desiccant based on the volume of the enclosed area.

5. Do not store valves next to operating electric motors or equipment which may emit ozone, which can cause deterioration of valve elastomers. Store in an environment with less than 0.1 ppm concentration, at least 25 feet from ozone emitting devices, with ventilation.

6. Valves with cylinder actuators and control valves which are stored for extended periods may be subject to cylinder blow-by caused by permanent distortion of any of the seals. Valves should be operated prior to installation and damaged seals replaced. If possible, it is recommended that cylinders be cycled every 4-6 months to maintain seals.

7. Valves with electric motor operators shall be stored in accordance with the individual motor manufacturer's recommended long term storage procedures.

8. All electrical components shall be visually inspected prior to valve installation.

SHORT TERM STORAGE (LESS THAN 6 MONTHS)

1. All valves shall be stored in the position in which they were shipped.

2. Valves shall be protected from dirt, debris, excessive moisture and UV exposure. Store at temperatures ranging from 35°F to 95°F (2°C to 35°C) with humidity levels not exceeding 50%.