



REACTION WASHER

BACKUP WASHER

J-WASHER

## HYTORC WASHER TYPES

The HYTORC WASHER system includes the HYTORC Reaction Washer, Backup Washer and the locking J-Washer. When used with compatible Torque tools the HYTORC Washer system eliminates the need for reaction arms, backup wrenches and dangerous pinch points. The standard HYTORC Reaction and Backup Washer provide improved speed and accuracy on every bolting job and are manufactured in accordance with the requirements in ASTM F3394/F3394M. The HYTORC J-Washer adds the locking feature to the reaction washer to keep bolted joints tight under vibration conditions.

### SAFETY



The HYTORC Reaction Washers and J-Washers provide an integrated reaction surface eliminating the need for reaction arms, which are the most common cause of injury on bolting jobs. The unique design allows the tool to react on the washer while turning the nut.

### SPEED



The HYTORC Backup Washer eliminates the need for backup wrenches improving the speed and efficiency of the overall bolting operation. The unique knurl design ensures the backup washers and back nut will not rotate during tightening.

### ANTI-LOOSENING



The HYTORC J-Washer is installed in applications where bolts can loosen as a result of relative motion between surfaces due to vibration. The J-Washer's inner knurl surface locks the nut when torque is applied so that loosening does not occur.

# COMPATIBLE JOINTS CONFIGURATION TYPES

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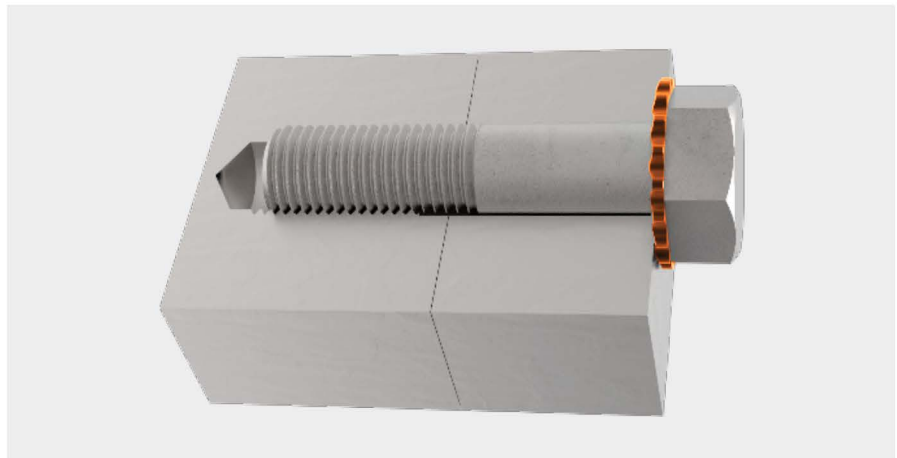
ASME standards and industry best practices recommend the use of through-hardened washers in bolted joint assembly. HYTORC Washers can be installed with existing bolts and studs found in a variety of joints types and applications to provide the following advantages:

- Protect the contact surfaces from damage due to friction while the nut is turned.
- Provide a rigid bearing surface that distributes the appropriate pre-load during tightening.
- Reaction Washers allow tightening tools to react directly on the washer.
- Backup Washers prevent the back-nut from turning.
- J-Washers prevent the joint from loosening under vibration conditions.

## TAPPED HOLES

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In tapped hole applications the HYTORC Reaction Washer is installed under the bolt head allowing the torque tool to engage the washer as a stationary reaction point and to engage and turn the hex head to tighten the bolt. Under vibration conditions the HYTORC J-Washer may be substituted instead of the Reaction Washer to prevent the fastener from loosening.



## THROUGH HOLES

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In through-hole applications the HYTORC Reaction Washer is installed beneath the turning bolt head or nut allowing the torque tool to engage the washer as a stationary reaction point and to engage and turn the bolt head or nut to tighten the fastener. Under vibration conditions the HYTORC J-Washer may be substituted instead of the Reaction Washer to prevent the fastener from loosening. The HYTORC Backup Washer is installed under back nut to keep the back nut from turning.

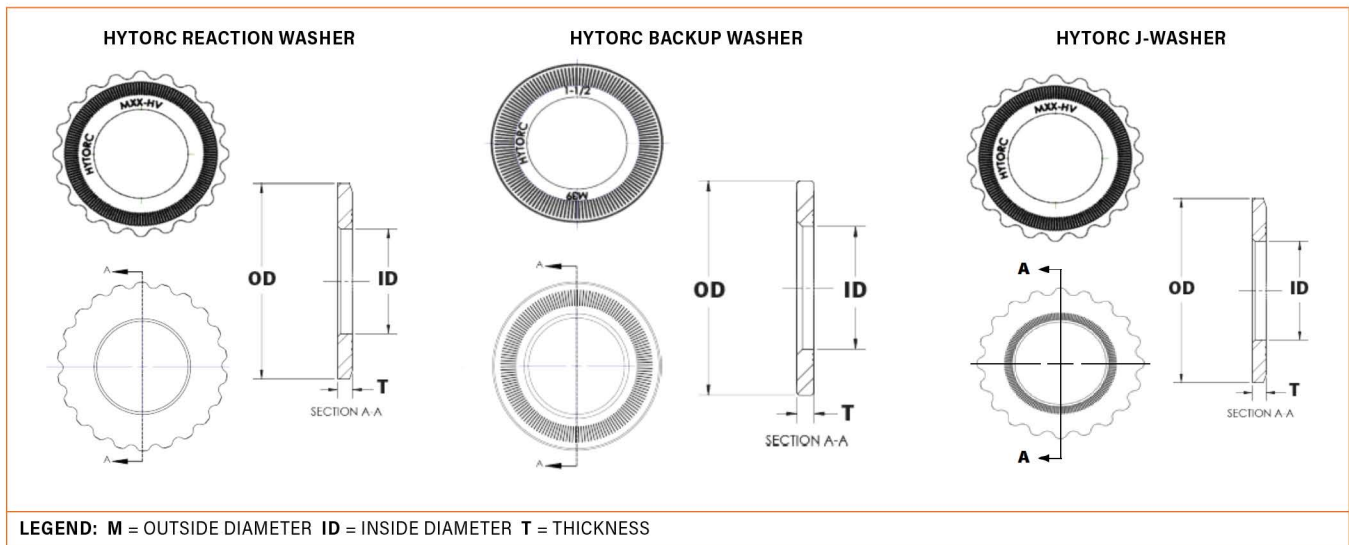
## STUDS

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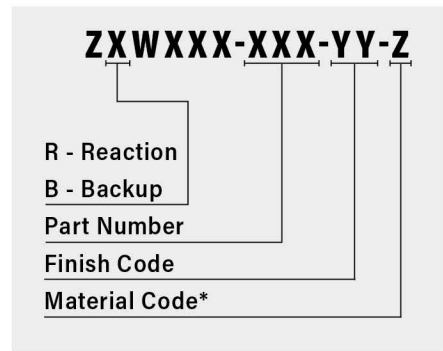
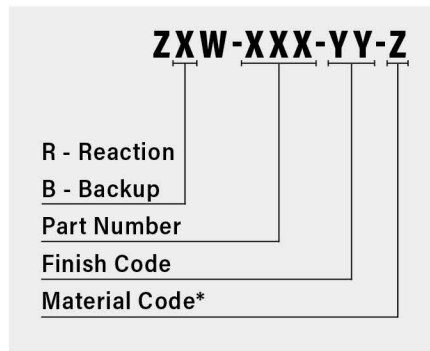
In applications with protruding studs the HYTORC Reaction Washer is installed under the nut allowing the torque tool to engage the washer as a stationary reaction point and to engage and turn the nut to tighten the bolt. Under vibration conditions the HYTORC J-Washer may be substituted instead of the Reaction Washer.

# HYTORC WASHER SPECIFICATIONS



## HYTORC REACTION AND BACKUP WASHER AND PART DESIGNATION

The HYTORC Washer is manufactured in accordance with the requirements in the ASTM F3394 Standard Specification for hardened Steel Backup and Reaction Washers. This standard covers general-purpose mechanical and structural use of washers with bolts, nuts, studs, washers and other threaded fasteners.



The HYTORC Reaction and Backup Washer are available in different materials and coatings. Please contact HYTORC to specify the Part Number, Finish Code and Material Code\*.

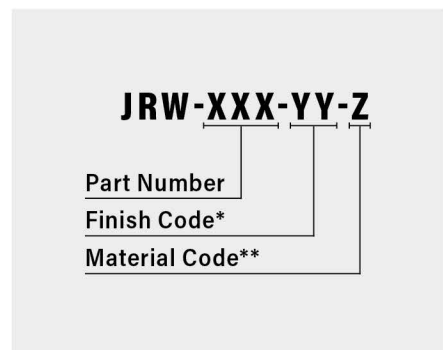
\* Material Code is used when alternative coatings and materials are specified.

## HYTORC J-WASHER REACTION AND PART DESIGNATION

HYTORC J-Washers are manufactured from AISI 4140 low alloy steel, hardened and tempered for superior strength, and finished with black oxide for corrosion protection. HYTORC J-Washers are suitable for harsh structural and industrial applications.

For standard J-Washers use the Part Number from the tables. Finish Code and Material Code shall be omitted from standard washer Part Numbers.

\* Finish code and material code are used only when alternative coatings and materials are specified.



REACTION WASHER (IMPERIAL)

BOLT SIZE	PART NUMBER	ID	OD	T
1/2"	ZRW-008	0.531	1.118	0.123
9/16"	ZRW-009	0.625	1.219	0.123
5/8"	ZRW-010	0.688	1.432	0.130
3/4"	ZRW-012	0.813	1.600	0.152
7/8"	ZRW-014	0.938	1.865	0.152
1"	ZRW-100	1.063	2.057	0.158
1-1/8"	ZRW102-M30	1.241	2.307	0.190
1-1/4"	ZRW104-M33	1.346	2.492	0.190
1-3/8"	ZRW106-M36	1.497	2.742	0.190
1-1/2"	ZRW108-M39	1.592	2.928	0.190
1-5/8"	ZRW110-M42	1.703	3.179	0.245
1-3/4"	ZRW112-M45	1.823	3.355	0.245
1-7/8"	ZRW114-M48	1.977	3.617	0.245
2"	ZRW200-M52	2.135	3.787	0.245
2-1/4"	ZRW204	2.341	4.280	0.298
2-1/2"	ZRW208-M64	2.662	4.768	0.335
2-3/4"	ZRW-212	2.863	5.265	0.335
3"	ZRW-300	3.117	5.595	0.405

BACKUP WASHER (IMPERIAL)

BOLT SIZE	PART NUMBER	ID	OD	T
1/2"	ZBW-008	0.531	1.005	0.120
9/16"	ZBW-009	0.625	1.086	0.120
5/8"	ZBW-010	0.688	1.227	0.130
3/4"	ZBW-012	0.813	1.449	0.150
7/8"	ZBW-014	0.938	1.650	0.150
1"	ZBW-100	1.063	1.870	0.160
1-1/8"	ZBW102-M30	1.236	2.092	0.190
1-1/4"	ZBW104-M33	1.346	2.309	0.190
1-3/8"	ZBW106-M36	1.492	2.526	0.190
1-1/2"	ZBW108-M39	1.592	2.742	0.190
1-5/8"	ZBW110-M42	1.703	2.959	0.250
1-3/4"	ZBW112-M45	1.818	3.175	0.250
1-7/8"	ZBW114-M48	1.972	3.392	0.250
2"	ZBW200-M52	2.130	3.608	0.260
2-1/4"	ZBW204-M56	2.336	4.120	0.300
2-1/2"	ZBW208-M64	2.657	4.500	0.340
2-3/4"	ZBW212-M72	2.858	4.920	0.340
3"	ZBW-300	3.112	5.250	0.410

J-WASHER (IMPERIAL)

BOLT SIZE	PART NUMBER	ID	OD	T
1/2"	JRW-008	0.531	1.118	0.123
9/16"	JRW-009	0.625	1.219	0.123
5/8"	JRW-010	0.688	1.432	0.130
3/4"	JRW-012	0.813	1.600	0.152
7/8"	JRW-014	0.938	1.865	0.152
1"	JRW-100	1.063	2.057	0.158
1-1/8"	JRW-102	1.241	2.307	0.190
1-1/4"	JRW-104	1.346	2.492	0.190
1-3/8"	JRW-106	1.497	2.742	0.190
1-1/2"	JRW-108	1.592	2.928	0.190
1-5/8"	JRW-110	1.703	3.179	0.245
1-3/4"	JRW-112	1.823	3.355	0.245
1-7/8"	JRW-114	1.977	3.617	0.245
2"	JRW-200	2.135	3.787	0.245
2-1/4"	JRW-204	2.341	4.280	0.298

Nominal dimensions for reference only.

REACTION WASHER (METRIC)

BOLT SIZE	PART NUMBER	ID	OD	T
M14	ZRW-M14	15.0	28.40	3.1
M16	ZRW-M16	17.0	30.96	3.1
M18	ZRW-M18	19.2	36.37	3.3
M20	ZRW-M20	21.1	37.01	3.3
M22	ZRW-M22	23.1	40.64	3.3
M24	ZRW-M24	25.3	47.37	4.1
M27	ZRW-M27	28.7	52.25	4.1
M30	ZRW102-M30	31.4	58.60	4.8
M33	ZRW104-M33	34.2	63.30	4.8
M36	ZRW106-M36	37.9	69.65	4.8
M39	ZRW108-M39	40.4	74.37	4.8
M42	ZRW110-M42	43.3	80.75	6.4
M45	ZRW112-M45	46.2	85.22	6.4
M48	ZRW114-M48	50.1	91.87	6.4
M52	ZRW200-M52	54.1	96.19	6.4
M60	ZRW-M60	64.0	108.71	7.6
M64	ZRW208-M64	67.5	121.11	8.6
M68	ZRW-M68	70.1	121.11	8.6
M72	ZRW-M72	73.9	133.73	8.6
M76	ZRW-M76	78.0	133.73	8.6
M80	ZRW-M80	82.0	142.11	10.0

BACKUP WASHER (METRIC)

BOLT SIZE	PART NUMBER	ID	OD	T
M14	ZBW-M14	14.99	25.53	3.1
M16	ZBW-M16	16.99	27.58	3.1
M18	ZBW-M18	19.23	31.17	3.3
M20	ZBW-M20	21.11	34.65	3.3
M22	ZBW-M22	23.09	36.8	3.9
M24	ZBW-M24	25.32	41.91	4.0
M27	ZBW-M27	28.7	47.5	4.0
M30	ZBW102-M30	31.39	53.14	4.8
M33	ZBW104-M33	34.19	58.65	4.8
M36	ZBW106-M36	37.90	64.16	4.8
M39	ZBW108-M39	40.44	69.65	4.8
M42	ZBW110-M42	43.26	75.16	6.4
M45	ZBW112-M45	46.18	80.65	6.4
M48	ZBW114-M48	50.09	86.16	6.4
M52	ZBW200-M52	54.10	91.64	6.4
M60	ZBW-M60	59.33	104.65	7.4
M64	ZBW208-M64	67.49	114.30	8.5
M68	ZBW-M68	70.10	114.30	8.5
M72	ZBW212-M72	72.59	124.97	8.5
M76	ZBW-M76	77.98	124.97	8.5
M80	ZBW-M80	82.04	133.35	10.3

J-WASHER (METRIC)

BOLT SIZE	PART NUMBER	ID	OD	T
M14	JRW-M14	15.00	28.40	3.1
M16	JRW-M16	17.00	30.96	3.1
M18	JRW-M18	19.00	36.37	3.3
M20	JRW-M20	21.00	37.01	3.3
M22	JRW-M22	23.00	40.64	3.3
M24	JRW-M24	25.00	47.37	4.1
M27	JRW-M27	28.00	52.25	4.1
M30	JRW-M30	31.00	58.6	4.8
M33	JRW-M33	34.00	63.3	4.8
M36	JRW-M36	37.00	69.65	4.8
M39	JRW-M39	40.00	74.37	4.8
M42	JRW-M42	43.00	80.75	6.4
M45	JRW-M45	46.00	85.22	6.4
M48	JRW-M48	50.00	91.87	6.4
M52	JRW-M52	54.00	96.19	6.4
M56	JRW-M56	58.00	108.7	7.6

Nominal dimensions for reference only.

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