WD® 3.5-inch Form Factor
Mounting and Screw Locations and Depths

1 Scope

This document is intended to describe the WD screw mounting capability within our enterprise and desktop SATA and SAS 3.5-inch hard drives.

WD meets all specification requirements as defined by the industry-standard Small Form Factor (SFF) committee as referenced in the applicable documents below.

The majority of enterprise mounting configurations utilize the side mounting holes, and for these users there are no changes or differences to any of our enterprise hard drive products. For those customers who are using the bottom mount holes, this document will describe the differences in our products.

2 Applicable Documents

The governing document from the SFF committee for 3.5-inch screw mount requirements is defined in SFF-8300. The detailed locations for OEM bottom mount holes, including the addition of alternative bottom mount locations, are defined in SFF-8301 rev 1.6.

Note: The tap specification requirements were omitted from this rev level; the tap dimensions are therefore grandfathered from SFF-8301 rev 1.4, which is embedded in SFF-8300 rev 1.2.

3 Background

Over the years, the number of disks within the hard drive casting has increased. With hard drive designs of 3 disks or less, there were minimal vertical space challenges, which allowed maximized screw penetration. As 4- and 5-disk platforms were being designed, the vertical spacing was challenged which forced minimization of the amount of bottom hole penetration while still staying within the industry standard requirements. To help avoid any additional changes in the future, WD intends to move newer designs to the "alternate" screw location for bottom mounts. Your design or adoption of bottom mount carriers to accept either set of screw locations provides WD with the maximum flexibility to provide high-capacity and high-efficiency hard drive designs moving forward. This document describes the different mounting conditions of present and future WD enterprise hard drives.

Described in this document will be the details of the following four different mounting conditions. See section 4.2, Tapped depth, fastener penetration, and thread engagement for detail.

- Current 1 to 3-disk products. These provide the deepest bottom hole screw depth penetration.
- Current 4-disk products. These reduce the screw depth penetration capability while still meeting the SFF standard.
- Current 5-disk products. These further reduce the screw depth penetration capability while also still meeting the SFF standard.
- Future alternate locations are being planned for some products.
    - While still meeting the SFF industry standard requirements, please be aware that anyone using bottom mount hole locations must prepare to accommodate both current bottom hole locations as well as the alternate locations.

4 Details

4.1 Screw positions

Source: SFF Committee, SFF-8301 Specification for Form Factor of 3.5" Disk Drives Rev 1.6 March 16, 2010

"The pair of bottom mounting holes located by dimension A7 is required. One additional pair of bottom mounting holes are required, either the pair of mounting holes located by dimension A6 or the pair of mounting holes located by dimension A13. Providing all three pairs of mounting holes (located by dimensions A7, A6 and A13) is allowed."

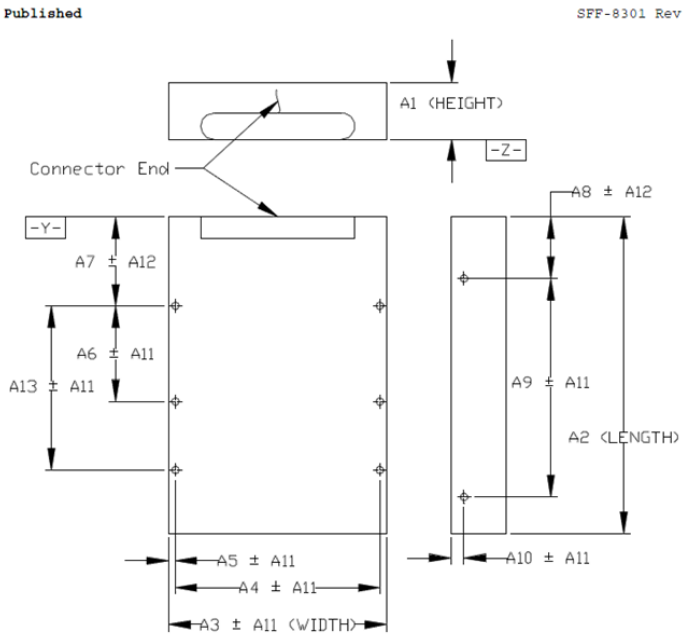

TABLE 4-1 3.5" DISK DRIVE DIMENSIONS

Dimension	Millimeters	Inches
A 1	17.80 *	0.700 *
A 1	26.10 *	1.028 *
A 1	42.00 *	1.654 *
A 2	147.00 *	5.787 *
A 3	101.60	4.000
A 4	95.25	3.750
A 5	3.18	0.125
A 6	44.45	1.750
A 7	41.28	1.625
A 8	28.50	1.122
A 9	101.60	4.000
A10	6.35	0.250
A11	0.25	0.010
A12	0.50	0.020
A 13	76.20	3.000

* = maximum

Figure 1. Bottom mount OEM holes, SFF requirements for alternate screw locations

4.1.1 Alternate screw locations

Listed in Figure 2 is the current bottom hole mounting locations for the 3-, 4-, and 5-disk product mounting options. See Figure 3 for future product alternate hole mounting locations.

Note: For future mounting designs utilizing bottom holes, please ensure your sled design accommodates both future and current hole locations.

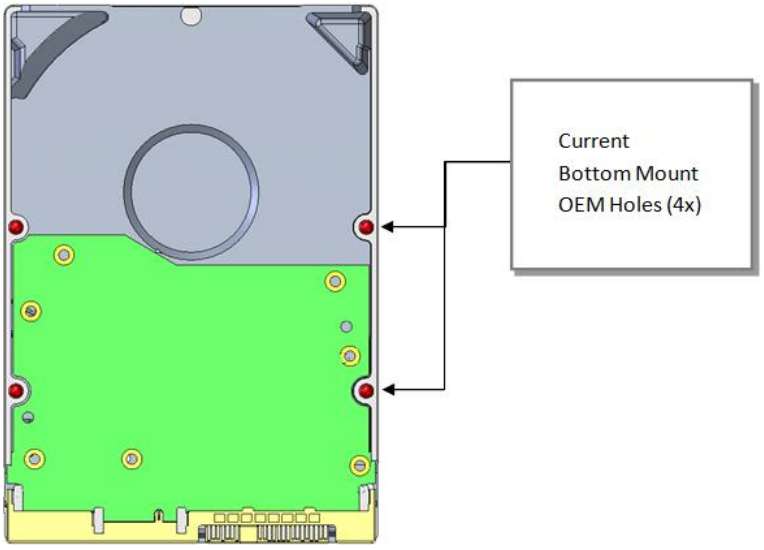

Figure 2. Bottom mount OEM holes, current locations

(3-, 4-, and 5-disk mount options)

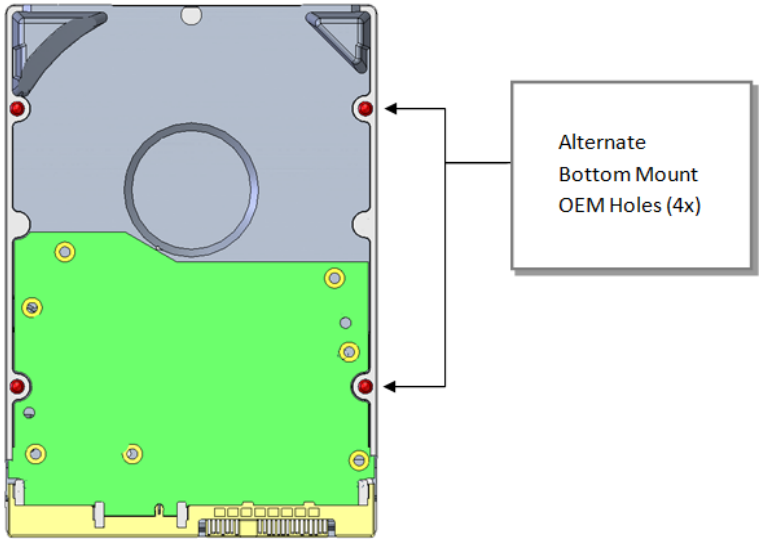

Figure 3. Bottom mount OEM holes, alternate locations

4.2 Tapped depth, fastener penetration, and thread engagement

Per SFF-8300 rev 1.2, all mounting holes must be tapped per 6-32UNC-2B, with depths and penetrations listed in Table 1 below in comparison to various WD products.

Table 1. Minimum thread depth and max fastener penetration for different WD products

		SFF-8300 rev 1.2 Figure 5-1		**Desktop (1 to 3-disk)**		**Desktop, RE (4-disk)**		**RE (5-disk)**	
		Side	Bottom	Side	Bottom	Side	Bottom	Side	Bottom
Min Thread Depth Dim "A"	threads	3	3	3.8	8	3.8	3.8	3.8	3.8
	mm	2.38	2.38	3	6.35	3	3	3	3
Max Fastener Penetration Dim "B"	threads	3.8	3.8	8	8	8	6.3	8	3.8
	mm	3.02	3.02	6.35	6.35	6.35	5	6.35	3.02

Industry form factor does not specify the minimum required thread engagement, but recommended screw lengths are included in Table 2 below.

Note: Using the screw length guidance in Table 2 based on sheet metal thickness, these screw options will work for all 3-, 4-, and 5-disk applications as well as future alternate locations.

Table 2. Recommended screw lengths for 6-32UNC mounting screws for given sheet metal thicknesses

Sheet Metal Thickness		**Screw length**	**Engagement (in threads)**
inches	mm	inches	
.006" to .038"	0.16 to 0.95	1/8"	2.8 to 3.8
.038" to .069"	0.95 to 1.75	** 5/32"	2.8 to 3.8
.069" to .100"	1.75 to 2.54	3/16"	2.8 to 3.8
.100" to .131"	2.54 to 3.33	** 7/32"	2.8 to 3.8
.131" to .163"	3.33 to 4.13	¼"	2.8 to 3.8

*** Denotes less common screw lengths*

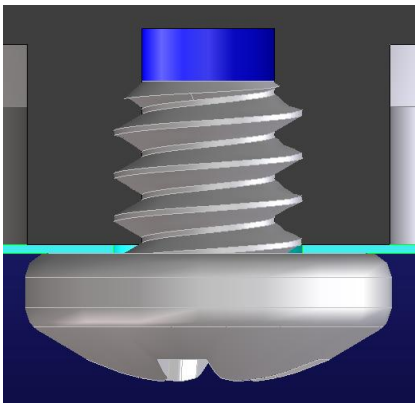

Figure 4. Bottom mount OEM hole, 6-32UNC X 1/8" (3.8 threads engagement)

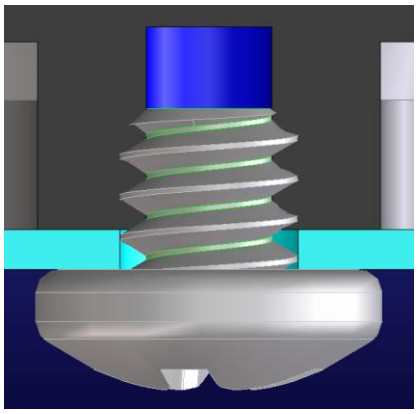

Figure 5. Bottom mount OEM hole, 6-32UNC X 1/8" (2.8 threads engagement)

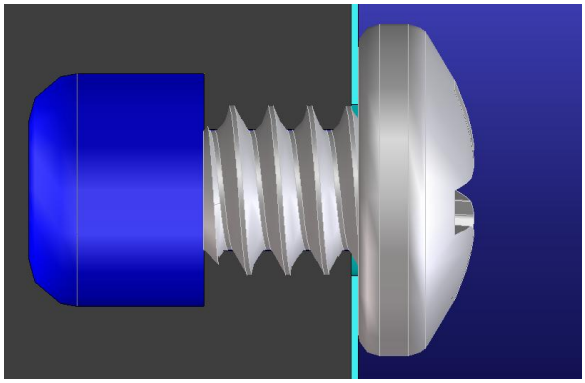

Figure 6. Side mount OEM hole, 6-32UNC x 1/8" (3.8 threads engagement)

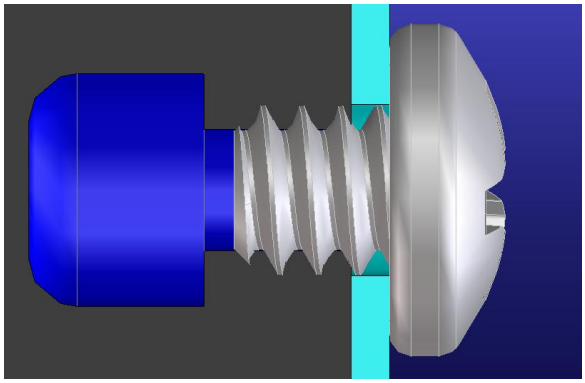

Figure 7. Option 2 – Side mount OEM hole, 6-32UNC X 1/8" (2.8 threads engagement)

Appendix A

For further information on the 3.5-inch form factor, go to http://www.sffcommittee.org.

Acknowledgments

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May Kung
Dan Reno
Yu-Min Lee
Michael Liebman
Shahriar Tafreshi
Don Shields

For service and literature:

http://support.wd.com
www.wd.com

800.ASK.4WDC	North America
800.832.4778	Latin America (Spanish)
+800.6008.6008	Asia Pacific
+800.ASK.4WDEU	Europe (toll free where available)
+31.88.0062100	Europe, Middle East, Africa

Western Digital
3355 Michelson Drive, Suite 100
Irvine, California 92612
U.S.A.

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