This is a standalone specification intended to inform payload designers. CSD manufacturers may also reference this specification to ensure compatibility.

FEATURES

These payloads are designed to be fully contained within Canisterized Satellite Dispensers (canister or CSD) during launch. A canister encapsulates the payload during launch and dispenses it on orbit. Canisters reduce risk to the primary payload and so maximize potential launch opportunity. Canisters also ease restrictions on payload materials and components. This specification currently encompasses three sizes of payloads. The 6U, 12U and 27U incorporate two tabs running the length of the ejection axis. The canister may grip these tabs, providing a secure, modelable, preloaded junction during launch. To maintain compatibility with existing standards the 6U can be made with typical rails as used in CubeSat. Note however with rails the payload is not preloaded in its canister and may chatter during launch.

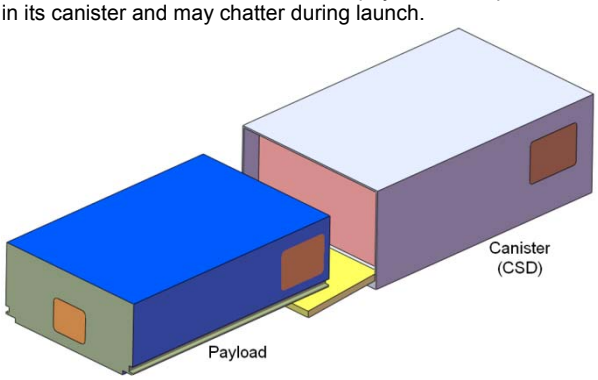


Figure 1: Payload deploying from Canister

CONTENTS

REVISION HISTORY

Revision	Date	Design	Review
-	18-Apr-2011	RH	WH
A	13-Jun-2011	RH	WH

Changes from previous revision:
Added Fig 1. Added Requirements. Added 12U and 27U to Fig. 2. Added Inhibit and Arm Circuit. Added Parameters. Added +/- Y face access zones. Added Benefits of Tabs. Allowed non-constrained deployables. Changed Environmental Testing. Changed Figs. 5-8. Added Test and Integration Flow. Added Additional Information. Added Authors.

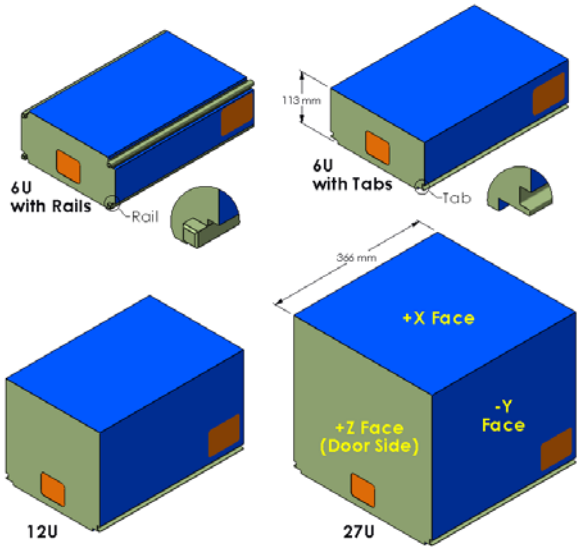


Figure 2: Payloads

INHIBIT AND ARM CIRCUIT

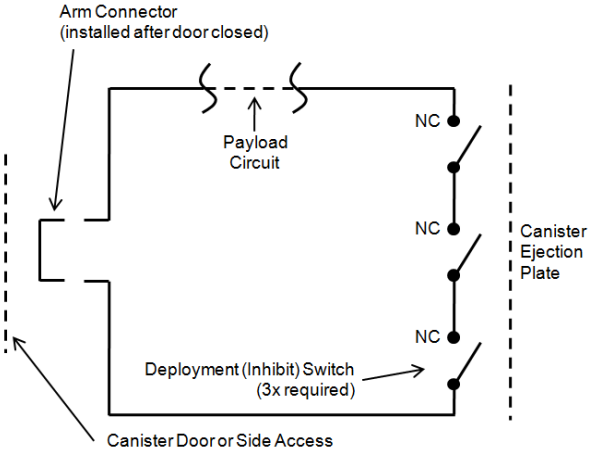


Figure 3: Payload inhibit and safe/arm circuit.

PARAMETERS

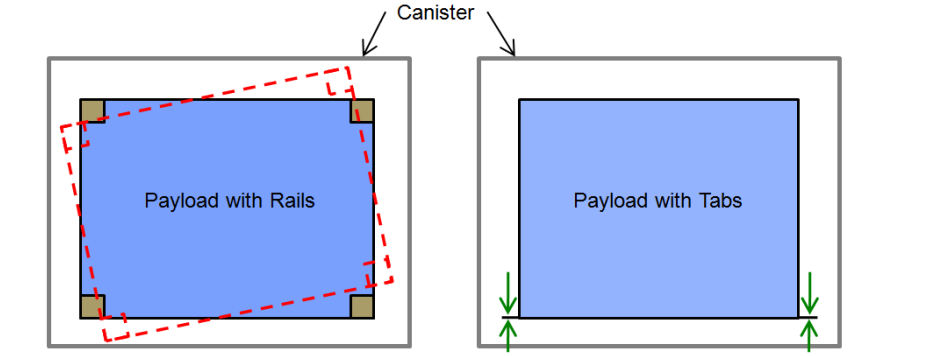
SYM	Parameter	Conditions	Unit	6U with Rails		6U with Tabs		12U with Tabs		27U with Tabs	
				Min	Max	Min	Max	Min	Max	Min	Max
M	Mass	At launch	kg	0	12	0	12	0	24	0	54
CMX	Center of mass, X	Stowed in canister	mm	30	70	10	70	55	125	100	180
CMY	Center of mass, Y	Stowed in canister	mm	-40	40	-40	40	-40	40	-60	60
CMZ	Center of mass, Z	Stowed in canister	mm	133	233	133	233	133	233	133	233
Depth	Maximum payload depth, +X dimension		mm	-	-	0	106.4	0	219.1	0	331.8
Width	Maximum payload width from origin, ±Y dimension		mm	-	-	0	119.5	0	119.5	0	175.9
Tab Width	±Y dimension		mm	-	-	237.6	238.0	237.6	238.0	350.3	350.7
Tab Length	+Z dimension		mm	-	-	360.9	365.9	360.9	365.9	360.9	365.9
DSX	+X dimension defining allowable zone for deployment switches		mm	-	-	-	100	-	212	-	325
FDS	Force from deployment switches, summated, Z axis	When contacting CSD ejection plate	N	0	2.2	0	2.2	0	2.2	0	2.2
DDS	Payload separation from ejection plate necessary to change deployment switch state, Z axis		mm	1.3	12	1.3	12	1.3	12	1.3	12
FFD	Friction force imparted on deployables from canister walls during ejection, summated		N	0	2.0	0	2.0	0	2.0	0	2.0
FND	Normal force deployables impart on canister walls during ejection, per wall		N	0	4.0	0	4.0	0	4.0	0	4.0
EL	External load on payload, any direction	supported solely by tabs or rails	g	29	(1)	29	(1)	23	(1)	16	(1)
TML	Total Mass Loss	Per ASTM E 595-77/84/90	%	0	1.0	0	1.0	0	1.0	0	1.0
CVCM	Collected Volatile Condensable Material	Per ASTM E 595-77/84/90	%	0	0.1	0	0.1	0	0.1	0	0.1
DP	Canister de-pressurization rate	During launch	psi/sec	0	0.5	0	0.5	0	0.5	0	0.5

(1) Load increases with reduced payload mass. Load[g] = 51-8.75*ln(mass[kg]).

COMMON REQUIREMENTS

1. Tabs or rails shall be 100% continuous hard anodized aluminum per MIL-A-8625 or similar. Minimum 0.001 inch total thickness (0.0005 penetration + 0.0005 build-up). Teflon impregnation is acceptable. Maximum surface roughness of rails = 0.8 µm Ra.
2. No debris shall be generated that will inhibit separation.
3. Deployment (inhibit) switches shall reside in specified zone on -Z face. Will activate upon contact with canister ejection plate.
4. Safe/Arm plug, if necessary, shall reside in specified zone on +Z, +Y, or -Y face.
5. All non-constrained deployables shall be hinged near the +Z face to minimize snagging hazards during ejection.
6. -Z face of payload shall withstand a 200 N force imparted by canister ejection plate during launch or ejection.
7. Payload may be electrically grounded by contacting canister ejection plate within inhibit switch zone.
8. Perform fit-check of payload with canister at earliest possible time.

BENEFIT OF TABS



Payload may vibrate in canister because of small gap between rails and canister walls.

Tabs guarantee an invariant load path, allowing useful predictions of dynamic response.

6U, 12U & 27U PAYLOADS WITH TABS

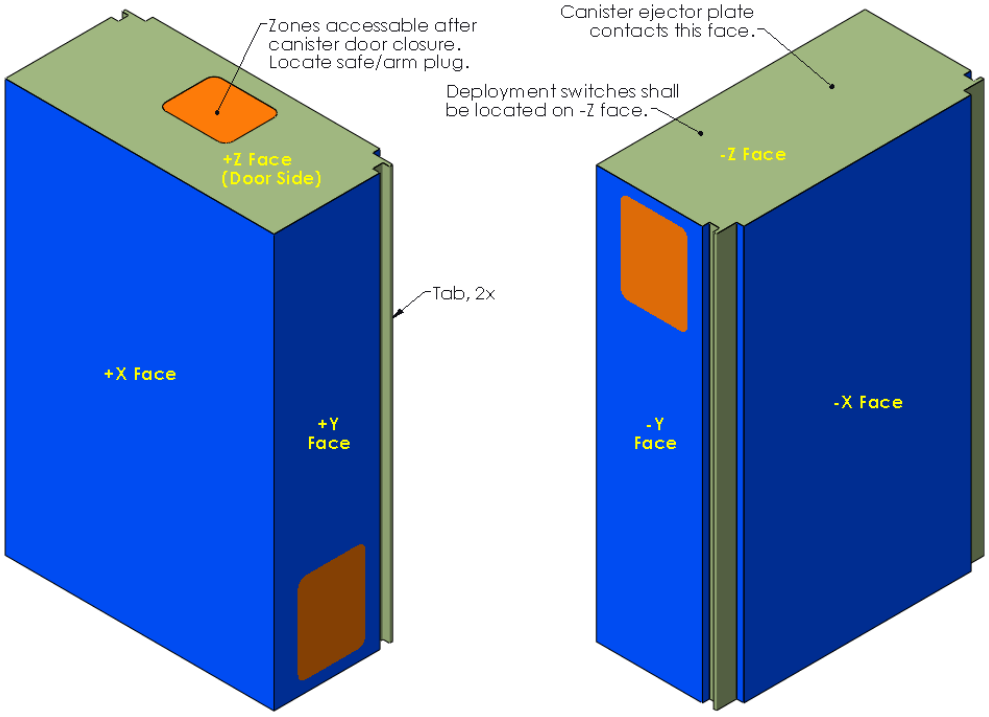


Figure 4: Tabbed payload (6U shown)

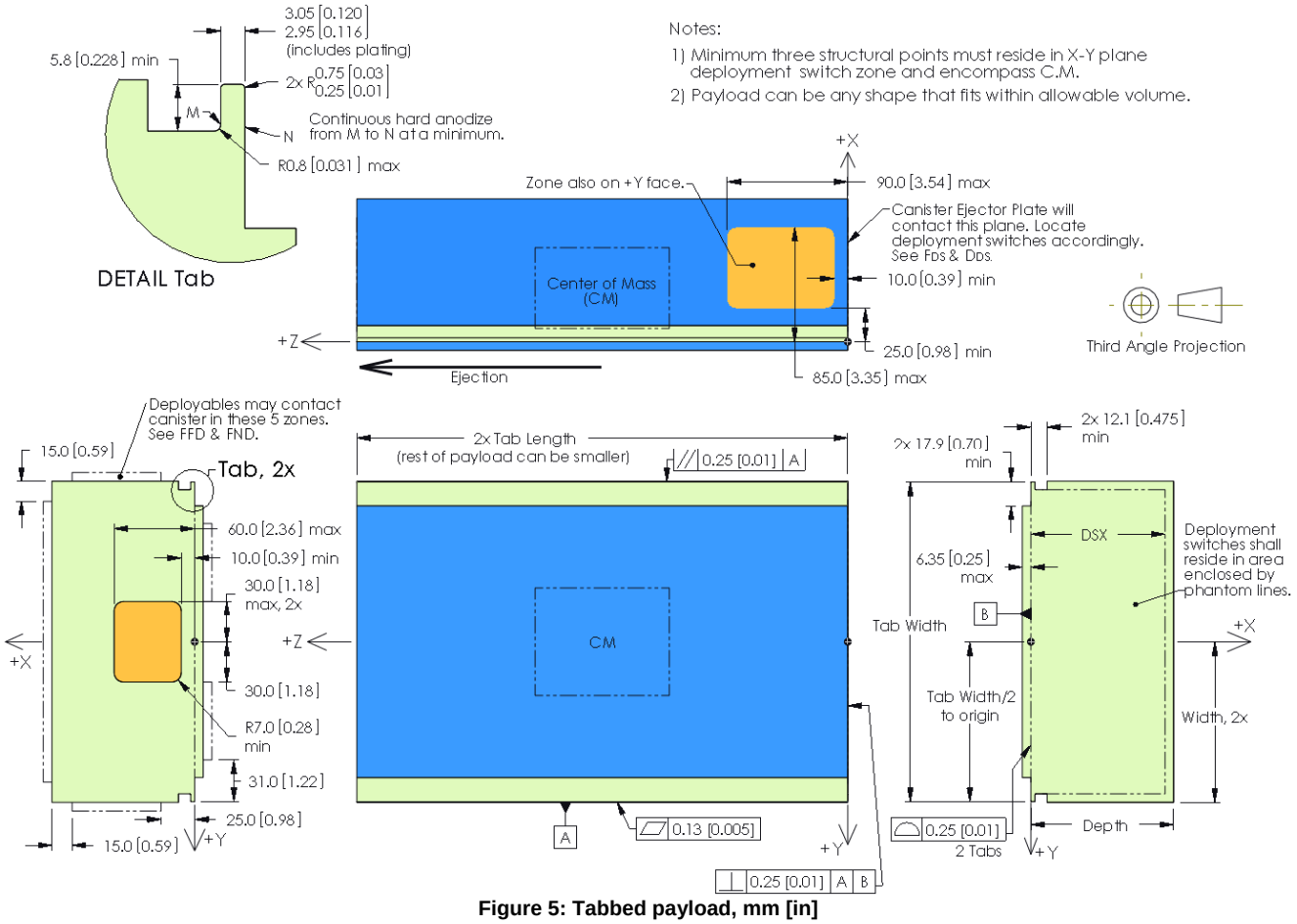


Figure 5: Tabbed payload, mm [in]

6U PAYLOAD WITH RAILS

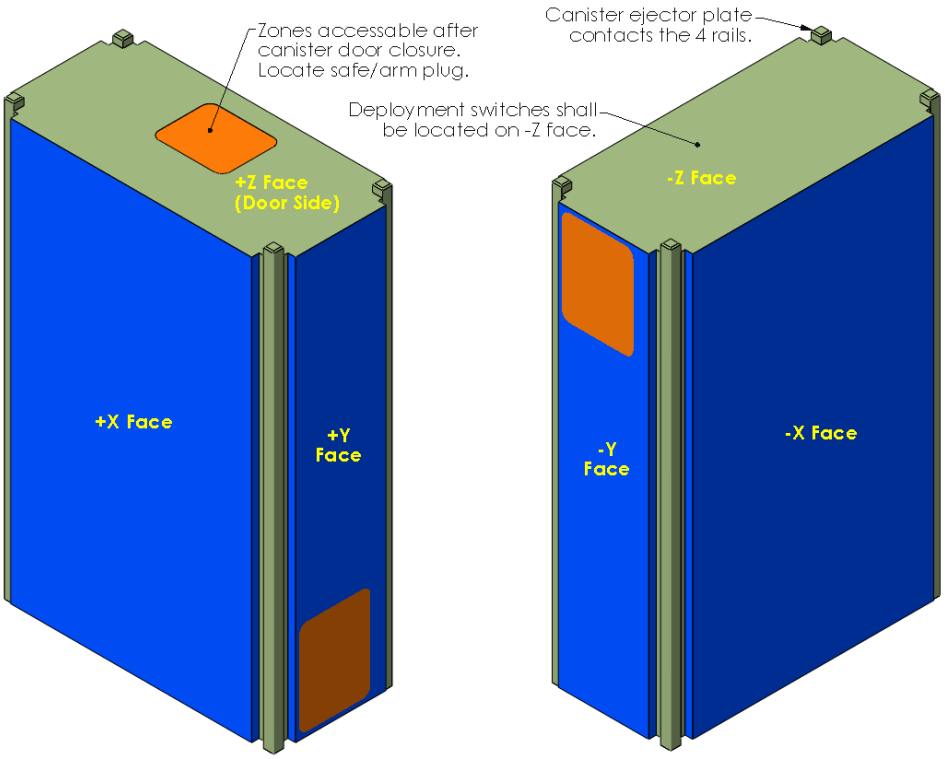


Figure 6: Payload with rails (6U only)

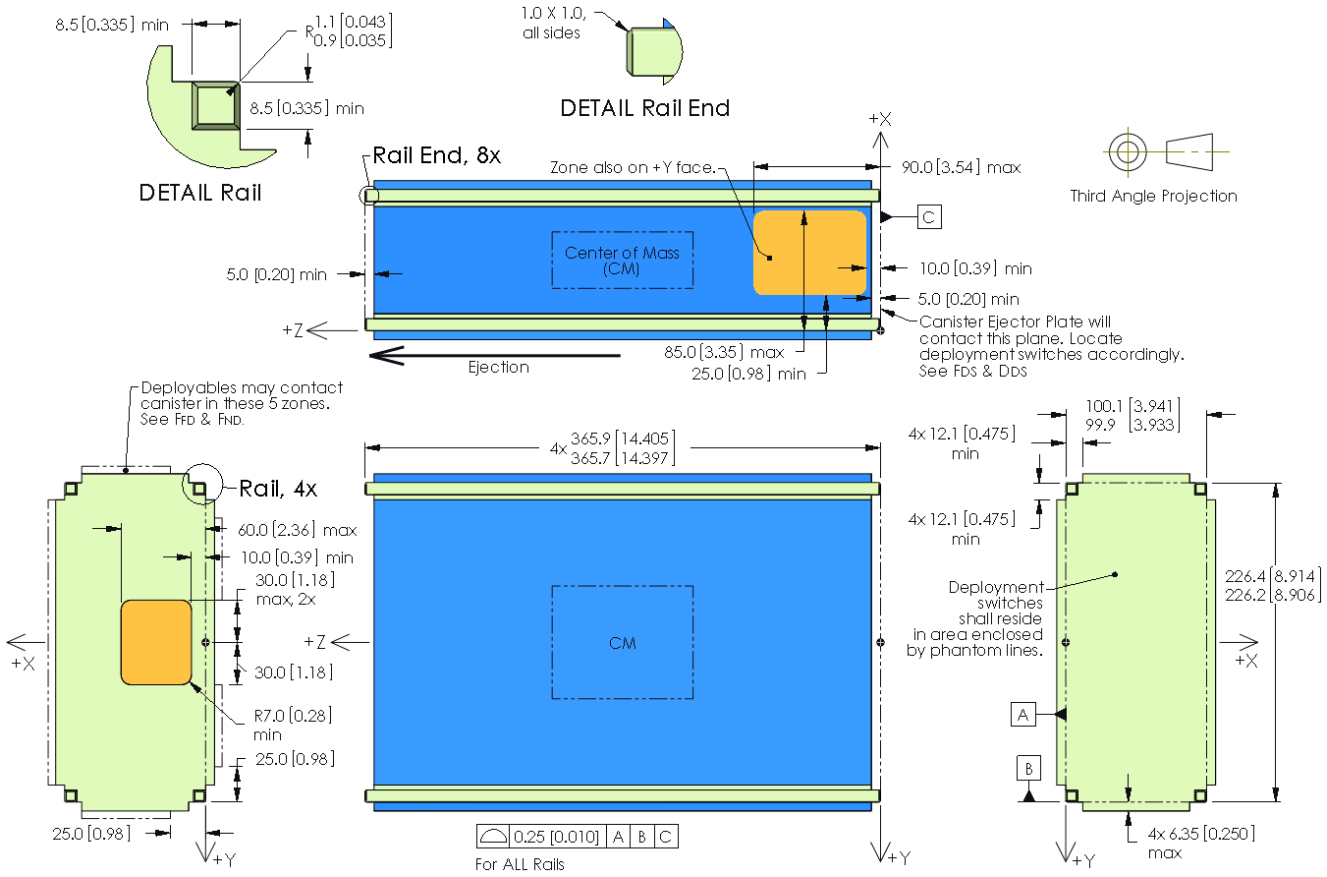
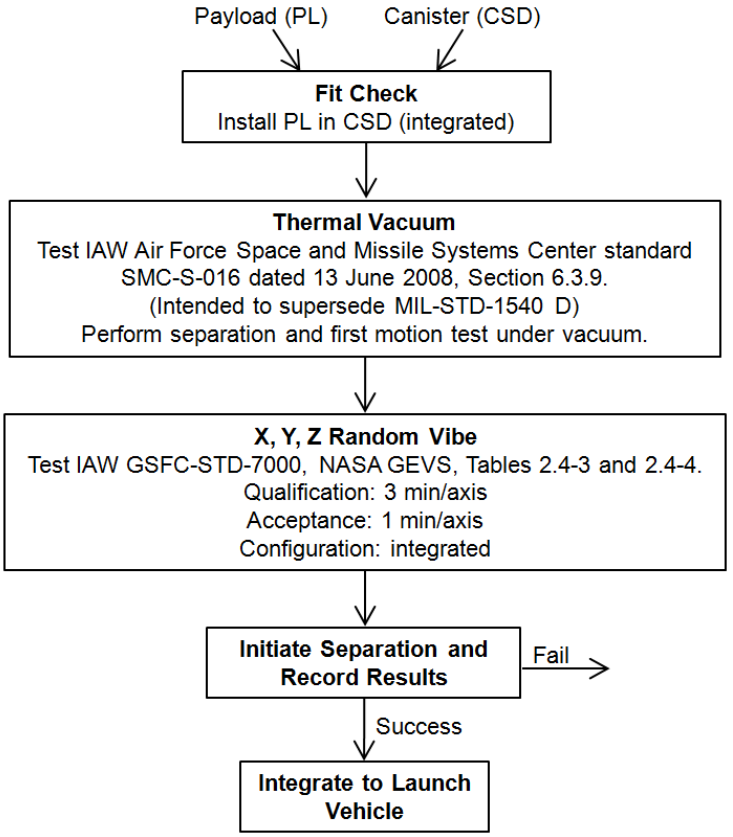


Figure 7: Payload with rails (6U only), mm [in]

TEST AND INTEGRATION FLOW

Test levels are for launch environment, not necessarily on-orbit.



ADDITIONAL INFORMATION

Verify this is the latest revision of the specification by visiting www.planetarysystemscorp.com. Simple step models and 3D PDFs of the payloads and canisters are also available. Please contact Ryan Hevner, ryanh@planetarysystemscorp.com with questions or comments. Feedback is welcome in order to realize the full potential of this technology.

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