US DMF* TYPE III FOR FIBER BOARD DRUMS FOR PHARMACEUTICAL PACKAGINGS

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He is associated with Perfect Pharmaceutical Consultants Pvt. Limited and Global Institute of Regulatory affairs (Pune, India). He is dedicated solely to regulatory profession. This article is solely written to guide, educate and train regulatory community at large.

This article is based self experience of 25 years of the author in serving Flexible packaging Industry for meeting their US DMF Type III Registrations and Facility Audit

SUMMARY:

The Fiber Board packaging materials are largely used in Pharmaceuticals for packaging API, Intermediate and excipients. US regulations under CFR 49 have prescribed a set of specification for controlling the quality of such packaging materials.

US FDA offers registration of Fiber Board packaging materials under US DMF Type III.
A very large number of Indian Companies have upgraded their site to meet US FDA requirements and have applied for US DMF. This article is written for the guidance of manufacturers and users of Fiber Board packaging materials
The author has personal experience for filing US DMF Type III for Fiber Board drums and other packaging materials for large number companies.

1. INTRODUCTION

Fiber Board Container in context to Pharmaceuticals is rigid packaging structures used to package and protect bulk drug products, drug intermediates and excipients.

Fiber Board Containers are usually made from soft wood fibers.
The container essentially includes following components:
Multilayer Kraft Paper body
Bottom and Top Plywood platform
Metal rings with clippers for joining container body with top and bottom support
The outer surface of the container is laminated, varnished and printed suitably.

According to one estimate more than two-thirds of all bulk drugs and excipients in the world are packaged and transported in fiber board drums or fiberboard IBC.
The most common examples of Fiber Board Containers are: Round Drums and Square Boxes

The identification code for a fiber drums under UN classification is: 1G.

2. ADVANTAGE OF FIBER DRUMS

1	Full UN approval for packaging groups II and III (solids)
2	Re-useable, re-cyclable and thermally recoverable (100% recyclable)
3	Volume range up to 170 Liters
4	Resalable and tamper evident
5	Light and very strong
6	Full mouth opens affording the facility for filling and emptying without difficulty.
7	Sides can be Painted, Waxed, Monogrammed and Varnished.
8	Locking Ring provided with locking and sealing arrangement to prevent pilferage.
9	Top and Bottom are of hot pressured plywood, giving rigidity to the drums.
10	Airtight
11	Availability in different sizes to suit specific requirements
12	Customizable to suit shipping requirements
13	Suitable for a wide range of drug products
14	Economical and lighter packaging
15	Easily disposed / recycled
16	High performance in terms of strength and durability
17	Great resistance to mechanical stress (stacking, static or dynamic vertical and radial compression, impact)
18	Electrostatic inertia and thermal insulation
19	Protection from UV radiation
20	Ease of use: the fully-openable top ensures quick filling and dispensing
21	Easy to dismantle for recycling
22	It ensures economy in shipping cost (less weight, compact)
23	Volume range up to 170 Liters
24	Resalable and tamper evident
25	Light and very strong
26	Pilferage Proof

3. COMPOSITION OF FIBER BOARD DRUMS

Design of fiber drums: The body of the drums must be constructed of multiple plies of heavy paper or fiberboard (without corrugations) firmly glued or laminated together and may include one or more protective layers of bitumen, waxed Kraft paper, metal foil, plastic material, or similar materials.

Top and bottom of the containers must be of natural wood, fiberboard, metal, plywood, plastics, or other suitable material and may include one or more protective layers of bitumen, waxed Kraft paper, metal foil, plastic material, or similar materials.

The body and heads of the drum and their joints must be of a design appropriate to the capacity and intended use of the drum. The assembled packaging must be sufficiently water-resistant so as not to delaminate under normal conditions of transport.

4.0 REQUIREMENTS FOR FIBER BOARD DRUMSAS PER US FDA CFR 49 § 178.508 Standards for fiber drums

1	The identification UN code for a fiber drum is 1G.
2	Construction requirements for fiber drums are as follows:
3	The body of the drum must be constructed of multiple plies of heavy paper or fiberboard (without corrugations) firmly glued or laminated together and may include one or more protective layers of bitumen, waxed Kraft paper, metal foil, plastic material, or similar materials.
4	Heads must be of natural wood, fiberboard, metal, plywood, plastics, or other suitable material and may include one or more protective layers of bitumen, waxed Kraft paper, metal foil, plastic material, or similar material.
5	The body and heads of the drum and their joints must be of a design appropriate to the capacity and intended use of the drum.
6	The assembled packaging must be sufficiently water-resistant so as not to delaminate under normal conditions of transport.
7	Maximum capacity of drum: 450 L.
8	Maximum net mass: 400 kg

5.0 TEST PROCEDURES FOR FIBER BOARD DRUMS: (Reference: CFR 49)

Fiberboard may be conditioned for at least 24 hours in an atmosphere maintained as per below:
(1) At 50 percent ±2 percent relative humidity, and at a temperature of 23° ±2 °C (73 °F ±4 °F); or
(2) At 65 percent ±2 percent relative humidity, and at a temperature of 20° ±2 °C (68 °F ±4 °F), or 27 °C ±2 °C (81 °F ±4 °F).

5.1 Drop test (§ 178.810)

Fiberboard container must be filled with a solid material to not less than 95 percent of their maximum capacity; the contents must be evenly distributed.

Test method: Samples of the filled drums must be dropped onto a rigid, non-resilient, smooth, flat and horizontal surface. The point of impact must be the most vulnerable part of the container being tested. Following the drop, the container must be restored to the upright position for observation.

Drop tests are to be performed with the solid to be transported or with a non-hazardous material having essentially the same physical characteristics.

The specific gravity of a substituted non-hazardous material used in the drop test must be similar to the drug/excipients intended for transportation.

Criteria for passing the test*:* For all design types, there may be no damage which renders the container unsafe to be transported for salvage or for disposable, and no loss of contents.

5.2 Stacking test (§ 178.815)

Number of Packages Tested	6
Test Duration	The stacking test load was applied to the top of the packages by loading each package with predetermined weight for 24 hours
Passing criteria:	No test sample may leak. There must be no leakage of the filling substance from the inner receptacle, or inner packaging. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packaging's likely to reduce safety in transportation.

5.3 Vibration Test

Number of Packages Tested	6
	Rotary vibration table/Vertical vibration table at well defined Hertz and rpm
Duration	1 Hour
Passing criteria:	A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength

Note:

All the tests are performed on filled packages. The packages were filled to a minimum of 95% full. 95%of Maximum Capacity of test packaging T= {(F-W) x .95] + W T = Test Mass, F = Mass of package when filled to 100%, W = Tare weight of all packaging materials
For all testing the packages were conditioned in accordance with 49 CFR 178.602(d) to 50% RH +/- 2% at 23 C for 24 hours or 65% RH +/- 2% at 20 C for 24 hours.

6.0 GENERAL REQUIREMENT OF CONTAINERS AS PER USP

1	The container shall protect the contents from environmental hazard, external influences (e.g. moisture, light, oxygen and temperature variations) , transportation hazards such as vibrations , storage hazards such as cracking under pressure
2	It shall not be composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health
3	It shall not be reactive, additive, or absorptive so as to alter the safety, identity, strength, quality, or purity of the products beyond the official or established requirements.
4	The integrity of the container must be met throughout the whole of the intended shelf-life of the product. The materials shall be conditioned to the 23°C and 50% RH before conducting any QC/QA tests.
5	Secondhand containers are mostly not allowed.
6	The product shall be supported by Certificate of Analysis (COA) or Certificate of Certification (COC) from the component supplier and the performance of an appropriate identification test, provided the supplier's test data are periodically validated
7	All test methods shall be fully described.
8	If a batch is to be accepted based on a supplier's COA or COC, then the procedure for supplier validation should be described. The data from the supplier's COA or COC should clearly indicate that the lot meets the applicant's acceptance criteria.
9	Dimensional information shall be provided via a detailed schematic drawing complete with target dimensions and tolerances
10	Description of the quality control measures used to maintain consistency in the physical characteristics of the material.
11	A complete description of the manufacturing process for the containers and its validation should be provided.

7.0 DIN STANDARDS FOR FIBER BOARD DRUMS (DIN 55350-31 (1985-12)

1	Paper type	Fresh Kraft paper/Recycled Paper
2	Glue type	Hot melt/starch based/synthetic
3	Bottom and Top plate	Plywood/metal
4	Gaskets / seals	Suitable
5	Number of plies used in body of the container	3,4,5 as per need
6	Overall height	Custom designed
7	External diameter	Custom designed
8	Volume of the container	Custom designed
9	Surface Finish	Folds/ridges scotches shall not be present on the surface of the container
10	Joining Rings	Shall be free from beads and welded joints
11	Outer surface	Can be printed directly, shall be free from any markings/sticking which can not be removed. Shall also support external label
12	Seals and lock ring	Must be supplied along with the

		container and must be suitable
13	External and internal surfaces	Must be clean
	Inside of the container	Shall be free from condensate, foreign substances, rust, surface active substances
14	Ring Connections	Connections betweens body and lock ring shall be firm.
15	Drop resistance	Meets the Test
16	Stacking resistance	Meets the Test
17	Design Uniformity	The design of all containers in a lot shall be uniform
18	Stress deformation (All containers must be placed on their base on level, hard ground and subjected to a uniformly distributed superimposed test load for a period of 24 hours)	There may be no loss of contents. Further there shall not be any permanent deformation.
19	Free from critical defects (container to be rejected)	Critical defects are those: Which renders the packaging unfit for use or affects the contents so much that human health may be jeopardized or may jeopardize environmental safety or may affect the purity and stability of the product
20	Free from Major Defects (container generally not allowed)	Major defects are those which severely impair handling and use of the packaging and lead to a loss of performance.
21	Free from Minor defects (Container generally permitted but improved suggested)	Minor defects are those which represent a general lowering of quality but do not limit the function of the packaging

8.0 OTHER INFORMATION REQUIRED FOR FIBER BOARD DRUMS

1	Material and site information	Material Name, code, brief description, Materials of construction and the address of the manufacturing site shall be provided
2	Manufacturing process and QC/QA	Description of the manufacturing process and operations, description of the quality control measures and description of the release specifications shall be provided
3	Vendors for Top and bottom plywood/metal plate	Shall be audited and certified
4	Vendor for Top and bottom Calipers	Shall be audited and certified
5	Vendors for raw materials such as Kraft Paper, polyolefin layer(s) aluminum foil Adhesives such as : Hot melt, silicate, starch, polyvinyl alcohol, polyolefin	Shall be audited and certified
6	Engineering Drawing of the product and components	Provide Drawings of the: Body, Top Cover, bottom cover ,Locking ring and liner
7	Information on environmental Impact	Information on deleterious substances/operations which may pollute the environment shall be provided

9.0 WHAT IS US DMF TYPE III FOR FIBER BOARD CONTAINERS

It is detailed information on Plain and Printed Fiber Board Drums used for packaging API and Excipients

DMF shall include detailed information in the prescribed format on components, control methods, manufacture process, release specifications, safety and suitability of fiber board container/closures system for Pharmaceutical packaging.

Further, it shall also include necessary admin information, transmittal letter and undertakings.

10.0 WHY YOU SHALL FILE DMF III FOR FIBER BOARD DRUMS?

1	It is a prestigious quality Accreditation
2	Your company name is displayed at US FDA website and your good will enhanced
3	Your packaging Materials are preferentially required by exporters of Pharmaceuticals
4	Your buyer gets legally bound with FDA to source all his packaging material from you and can not replace you easily
5	It improves your quality system
6	It raises the moral of your management and staff
7	It establishes cGMP at your works
8	It keeps your major competitors away
9	Your company gets associated and recognized by US FDA
10	You become legally authorized to supply your packaging material to pharmaceutical companies exporting to US

11.0 WHAT ARE YOUR OBLIGATIONS AFTER FILING US DMF

You shall upgrade your quality system and keep it current with GMP norms.
You must file an annual report about the changes in manufacturing facility with US FDA

12.0 WHAT ARE THE RISKS INVOLVED IN FILING US DMF:

If the submission is incomplete or inadequate, it will be returned to the submitter with a letter of explanation and it will not be assigned a DMF number.
If there are deficiencies in the submission, a letter describing the deficiencies is sent to the DMF holder.
However, if DMF is filed through an experienced consultant, the risk involved is negligible. It gets cleared in the first attempt without any queries.

13.0 WHAT IS THE CRITICAL ADMIN INFORMATION REQUIRED FOR FILING US DMF TYPE III

1	Detailed address of Site
2	List of the products for which DMF is required
3	Name of the DMF Holder
4	Detailed Site plan
5	Transmittal Letters as defined by FDA
6	Detailed dossier on the products manufactured

14.0 WHAT ARE THE SERVICES USUALLY OUTSOURCED ON US DMF TYPE III FOR FIBERBOARD DRUMS

Following services are usually outsourced from regulatory consultants:

No	Services Outsourced through Consultants
1	Performing Plant audit and gap analysis
2	Identifying the products for which DMF can be filed readily
3	Training person for cGMP Compliance
4	Organizing required technical and admin info as required for submission
5	Customization of submitted information
6	Drafting and submitting an annual report on the anniversary date of the original submission.
7	Changing the ownership of DMF
8	Filing a new DMF when there are major changes in the manufacturing process
9	Revoking a DMF closed due to negligence in filing an annual update
10	Updating DMF against request of company who desires to use your products inn the drug products being manufactured by him. In such cases updates are directly submitted to FDA authorities
11	Providing additional information against FDA request.
12	Protecting the confidential information of the DMF holders
13	Replying FDA queries on the submission
14	Assisting in the preparation and submission of DMF.
15	Providing US FDA Agent service. Submitting your files to FDA
16	Identifying test requirements to support submission.
17	Writing/editing/systemizing and organize the required information as per FDA Norms
18	Filing periodical updates and Annual report to FDA
19	Reactivating DMF which have been closed by FDA
20	Ensuring issue of DMF number to your submission.
21	Ensuring listing of your DMF on FDA website

(All above services are provided by Perfect Pharmaceutical Consultants Pvt. Ltd, Pune with which the author is associated)

Conclusion: The Fiber Board packaging materials are preferred packaging material for drugs, drug intermediates and excipients. The quality and integrity of the same is largely controlled by CFR 49 and USP. In addition there are numerous standards issued by various standardizing agencies such as ISO, ISI, DIN and BIS. The most prestigious mark for Fiber Board drums is US DMF* Type III

Note**: Please visit website of Perfect Pharmaceutical Consultants Pvt. Ltd http://sites.google.com/site/ppcdmf/home to view more article published by the author**

*FACTS ABOUT US DMF

1. A Drug Master File is a package of technical information drafted as per US FDA requirements on your product.
   Drafting and submitting DMF is a skilled and talented job.
   It requires deep and complete understanding and experience on regulation of drug products.
2. It is filed voluntarily to prompt your products.
   It safeguards your confidential information about your company and products.
3. It is reviewed only by FDA as and when needed but never disclosed to any third party.
4. It confirms that product is of highest quality and meets all FDA norms.
5. You don't have to prove your quality individually to each customer. DMF No and DMF listing on US FDA site is mark and proof of your quality
6. DMF ensures that your products are of good quality and meets all regulatory standards.
7. It protects your proprietary information.
8. It allows a timely, seamless review of information only by FDA for number of applicants at one time.
9. FDA has introduced this system in 1989. It was updated in 1999. The information is required to be submitted in a particular format covering admin Composition, Manufacturing and Controls details as applicable to the product.
10. Whenever there is a change in the materials, equipment or procedures it shall be updated accordingly
11. Once you agree to supply your material to any customer under LOA it gets legally recorded with FDA

References

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