Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

Fill Power testing has undergone dramatic changes throughout its continuing evolution. These changes have all helped to improve the reliability and reproducibility of Fill Power testing.

Two main questions are always asked by buyers of both bulk down and feathers as well as finished products:

1. **What is the original Fill Power of the bulk down and feather filling material that we purchased?**

2. **What is the "usable" Fill Power of the down and feathers that the end consumer will experience while using the product?**

Many different measuring systems and cylinders exist to measure Fill Power:

- IDFB - Lorch mm/30g
- IDFB - Lorch cubic inches/ounce
- EN 12130 - mm/20g or cubic cm/g
- Old USA Cylinder - cubic inches/ounce
- JIS Cylinder - cm/30g
- New JIS Cylinder - cm3/g
- China GB/T Cylinder - cm/28.5g
- China FZ/T Cylinder - cm/28.5g

All of the above systems can be converted to the approximate value of another system with standard factor tables. The conversion does **NOT** take into account the conditioning method. The only accurate Fill Power result for the different methods is to test according to the specific method.

The most critical part of Fill Power testing is the conditioning method. Any of the conditioning methods can be used with any of the cylinders and measuring systems. Most countries and regions specify which conditioning method should be used with which cylinder.

The following pages describe the conditioning methods and the chemical/physical reasons why conditioning is important for testing Fill Power.

在过去 10 年中，蓬松度检测标准经历了剧烈的变革；这些变革推动了蓬松度检测标准不断向前发展，提高了检测标准的可靠性和再现性。

大宗羽绒羽毛原料及羽绒羽毛制成品的买家最经常咨询的两大问题是：

1. **买家购买的大宗羽绒羽毛填充原材料的 "原始蓬松度值"是多少？**

2. **消费者购买的羽绒羽毛制成品所含的最终可供消费者使用的"可用蓬松度值"是多少？**

目前国际上存在着多种不同的蓬松度检测标准、测量体系和检测仪器：

- 国际羽绒羽毛局（IDFB）官方检测标准 – 洛奇检测仪/毫米/30 克
- 国际羽绒羽毛局（IDFB）官方检测标准 – 洛奇检测仪/英寸/盎司
- 欧洲标准 EN 12130 – 毫米/20 克 *或* 立方厘米/克
- 美国标准（USA）– 圆筒检测仪/立方英寸/盎司
- 日本标准（JIS）– 圆筒检测仪/厘米/30 克
- 中国标准（GB/T）– 圆筒检测仪/厘米/28.5 克
- 中国标准（FZ/T）– 圆筒检测仪/厘米/28.5 克

上述任意一种检测标准所测定的数据都可以按照相应的标准换算公式转换成为另一种检测标准所测定的数据的近似值。需要注意的是，换算结果跟还原方法毫不相干。准确的蓬松度测试结果必须按照特定的测试方法获得。

蓬松度检测中最关键的是还原方法。任何一种还原方法都可以配备任何一种检测仪器及检测标准。大多数国家和地区指明对应的还原方法和检测仪器及检测标准。

接下来的内容将阐明还原方法，并从化学和物理的角度解释还原方法对蓬松度检测的重要性。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

Brief Explanation of the six different conditioning methods

1. No Conditioning
Down processors often use no conditioning to measure Fill Power immediately after washing and sorting down & feathers.

2. Oven Heating GB/T
The Chinese GB/T conditioning method for Fill Power requires down to be heated at 70° C for 45 minutes and then conditioned in a textile climate room for 24 hours before testing.

3. Oven Heating FZ/T
The Chinese FZ/T conditioning method for Fill Power requires down to be heated at 50° C for 60 minutes and then conditioned in a textile climate room for 24 hours before testing.

4. Box Conditioning
Down and feathers are placed in a conditioning box for 72 hours in a textile conditioned room (20°C ±2°C and 65% RH ±4%)

This conditioning method has been used for decades. Most test methods including EN 12130 and IDFB have required this conditioning method for many years.

5. Tumble Dry
IDFL developed the Tumble Dry conditioning method in 1996. IDFL published initial results of our research in January 1997.

In 1999, the IDFB officially adopted the Tumble Dry conditioning method as part of its Fill Power method. Europe also adopted the Tumble Dry method in the PAS 1003 document in 1999. IDFB has since cancelled this method as an official method.

6. Water Rinse
IDFL developed the Water Rinse conditioning method in 1996 and published results of our research in 1997. The water rinse method is a good indicator of Fill Power after a consumer washes a down product.

7. Steam

Japan developed a Steam Conditioning method in 2004. IDFL and the Japanese Down and Feather Association developed a revised steam method 2005. The IDFB Technical Committee voted to adopt the Steam Conditioning method during the Kyoto IDFB meetings in June 2005. Steam is the only active IDFB approved test method.

六种不同还原方法的简要说明

1. 不还原
羽绒羽毛加工商经常在完成对羽绒和羽毛的清洁和分类后不还原就立即进行蓬松度检测。

2. 烘箱还原 GB/T
中国标准（GB/T）还原方法要求将羽绒放置于烘箱中以 70 摄氏度的温度持续加热 45 分钟；之后将其放置于一间符合纺织品适宜环境标准的房间中，24 小时后取出进行蓬松度检测。

3. 烘箱还原 FZ/T
中国标准（FZ/T）还原方法要求将羽绒放置于烘箱中以 50 摄氏度的温度持续加热 60 分钟；之后将其放置于一间符合纺织品适宜环境标准的房间中，24 小时后取出进行蓬松度检测。

4. **普通还原**
将待检测羽绒和羽毛放置在一个还原的箱子中，并将该箱子置于一间符合纺织品适宜环境标准的房间（房间温度为 20° C ±2° C，相对湿度 65%±4%），72 小时后将其取出进行蓬松度检测。
该检测方法已在国际上通行数十年。大多数检测标准，如欧洲标准 EN 12130 和国际羽绒羽毛局（IDFB）官方检测标准多年来都要求用此方法。

5. **滚动烘干还原**
国际羽绒羽毛检测实验室（IDFL）于 1996 年发明了滚动烘干还原法，并于 1997 年 1 月发布了初始研究结果。

1999 年，国际羽绒羽毛局（IDFB）官方正式将滚动烘干还原法纳入国际羽绒羽毛局（IDFB）官方蓬松度检测标准。1999 年，欧洲也在 PAS 1003 文件中正式批准采用滚动烘干还原法。

6. 水洗方法还原
国际羽绒羽毛检测实验室（IDFL）于 1996 年发明了水洗还原法，并于 1997 发布了相关研究结果。水洗还原方法是消费者清洗羽绒产品后对应蓬松度的指标。

7. 蒸汽还原
日本于 2004 年发明了蒸汽还原法。国际羽绒羽毛检测实验室（IDFL）联合日本羽绒羽毛协会（JDFA）于 2005 年对该方法进行了改进，制定了修订版的蒸汽还原法。2005 年 6 月，在日本东京召开的国际羽绒羽毛局（IDFB）大会上，国际羽绒羽毛局（IDFB）技术委员会通过投票决议，批准将蒸汽还原法纳入国际羽绒羽毛局（IDFB）官方蓬松度检测标准。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

The Interaction of Down and Feathers with Moisture and Temperature

Down and Feathers (chemically very closely related to human hair) consist of natural macro-molecules. These are based on proteins, which in turn, are assembled of various amino acids. The entire family of these organic chemicals work in a physical-chemical interaction with water molecules. As for down and feathers, the moisture content reaches an equilibrium of approximately 11 % at close to standard climate conditions (23°C and 60 % relative humidity).

The natural construction (3-dimensional arrangement of molecules) of each individual down or feather has a very stable form. Unless chemically or thermally mistreated, no matter how hard the down is twisted or compressed, it can (like naturally curly hair) return to its original form. In metallurgy this phenomenon is known as “memory effect”. In the case of the protein macromolecules (the building blocks of down and feathers), warmth and moisture support this (re-)activation of the structural memory.

When customers use a duvet, a sleeping bag or a down jacket, they exude moisture and warmth and the down cluster “opens up”. This helps to increase the insulation value of the product, which may have been hard compressed for a long period of time. Customers may become more happy with the new duvet after use. The effect may continue after the first use and improvement may occur after 2 or 3 nights.

For this reason, in quality testing, the final readings of Fill Power are usually measured after 3 to 4 days. For the same reason, and to simulate this positive human influence on the Fill Power or loft of a down product, various conditioning method were developed.

Development of conditioning methods to mimic use of down by consumers

The Tumble Dry conditioning method, developed by IDFL in 1996, was a big step in the development of a method to accurately measure the insulation capability of down and feather products. In 1996, IDFL also proposed the Water Rinse method. The Water Rinse method was developed specifically

羽绒和羽毛的温度和湿度的交互作用

羽绒和羽毛（从化学的角度上来看就像人的头发）由无数的氨基酸按照一定的结构顺序组合成为蛋白质，无数蛋白质进一步构成了天然高分子，而羽绒和羽毛正是由众多天然高分子所构成。所有这些有机化学物质与水分子之间产生了一种物理化学交互作用。在标准适宜环境条件下（温度为 23° C，相对湿度 60%），其所含水分能达到一种平衡状态，含量大约为 11%。

由于羽绒和羽毛的分子结构呈三维立体状，因此每一个羽绒和羽毛的自然结构都具有非常稳定的形态。除非受到过度的化学或热度影响，否则无论何种程度的扭曲、绞捻、挤压，羽绒都能够恢复到初始形态，就像自然卷发。这种现象在冶金学上被称为“形状记忆效应”。正是蛋白质高分子（羽绒羽毛的基本组织结构）、温度和湿度的相互作用赋予了羽绒这种特殊的“形状记忆效应”，激活了羽绒的结构记忆。

羽绒的球状纤维能随着温度的变化而收缩膨胀，消费者在使用棉被、睡袋或羽绒夹克时，人体所散发出来的水分和温度会被羽绒所吸收。羽绒的这种特性有助于提高产品的热绝缘性能即保暖性能，即使某产品已经经受了长时间的猛烈挤压。一条新棉被，随着使用次数的增多，消费者对其满意程度也随之逐渐提高。羽绒产品的保暖性能在产品首次使用后将继续保持下去，并在使用 2-3 次后可能进一步得到提升。

鉴于以上原因，在质量检测中，蓬松度最终检测通常要等待 3-4 天后方可进行。同样由于以上原因，为模拟人类对羽绒产品的使用行为对羽绒产品蓬松度所施加的积极影响，各种有关蓬松度的检测方法应运而生。

模拟消费者对羽绒产品使用的还原方法的发展

1996 年，国际羽绒羽毛检测实验室（IDFL）发明了滚动烘干还原法，这是发展精确测量羽绒羽毛制成品热绝缘性能的检测方法的一次伟大进步。1996 年，针对某些产品（特别是挤压过的羽绒夹克和睡袋）不适合使用滚动烘干还原法进行检测的情况，国际羽绒羽毛检测实验室（IDFL）随即又提出了水洗还原法

根据经验之谈，温度每升高 10 摄氏度，物质的化学反应速率便会比普通速率加快两倍。因此，羽绒和羽毛需要在高温条件下接受清洗和烘干。羽绒加工厂、处理厂在完成对羽绒羽毛的清洗和分类后，立即对羽绒和羽毛进行蓬松度检测所得出的蓬松度数据就是所谓的“原始蓬松度值”。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

because some products (especially compressed jackets and sleeping bags) did not respond properly to Tumble Dry.

The tempo of a chemical reaction is accelerated by a factor of 2 with each 10°C rise in temperature. Down and feathers are washed and dried at high temperatures. Original Fill Power is determined by the Fill Power test that occurs immediately after washing and sorting at the down factory.

The industry has always searched for a method that could reproduce the original Fill Power tested at the down factory. Tumble Dry was a great improvement over the Box Conditioning method. However, Tumble Dry was not entirely successful at reproducing Fill Power for products that had been compressed for several weeks during shipment.

Japanese manufacturers worked to find a method for reproducing the original Fill Power that was tested at the down and feather washing factory. This goal was achieved by applying a concentrated form of moisture (steam) and higher temperature (hot steam).

IDFL began a series of several thousand tests comparing original Fill Power with Fill Power after various shipping and compression techniques. IDFL baked down for several hours, compressed down with 1000 pounds of pressure, repeatedly washed down products, and vacuum packed products for several weeks. After all the thousands of tests IDFL came to the conclusion that the Japanese steam method was the only method that successfully reproduced the original Fill Power value regardless of the harsh handling, shipping and compression of finished products.

整个羽绒羽毛行业一直在探寻一种可以完全再现产品“原始蓬松度值”的检测方法。相比普通还原法，滚动烘干还原法取得了重大的进步。然而，滚动烘干还原法并不是十全十美的，对那些在运输过程中被挤压长达数周的产品，滚动烘干还原法并不能完全成功地再现产品的“原始蓬松度值”。

日本的生产制造商通过合作，共同发明了一种能够再现羽绒羽毛在水洗厂接受蓬松度检测时所得出的“原始蓬松度值”的检测方法，即“蒸汽还原法”。该方法所使用的是高温高压蒸汽。

国际羽绒羽毛检测实验室（IDFL）进行了数千次检测试验，旨在对羽绒的“原始蓬松度值”和经过各种运输及挤压后产品的“实际蓬松度值”进行比较。国际羽绒羽毛检测实验室（IDFL）对羽绒进行长达数小时的烘烤，用 1000 磅的高压挤压羽绒并反复清洗羽绒产品。同时，国际羽绒羽毛检测实验室（IDFL）还使用真空包装将羽绒产品存放数周。经过类似这样的上千次检测试验后，国际羽绒羽毛检测实验室（IDFL）得出以下结论：日本蒸汽还原法是唯一的一种能够成功再现羽绒“原始蓬松度值”的检测方法，即使羽绒羽毛制成品受到了粗糙处理、长途运输和各种挤压的影响。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

Which Fill Power Conditioning Method is the most Accurate?

This is a good question and can be answered in two parts.

Original Fill Power
Original Fill Power is defined as the Fill Power tested immediately after washing and sorting at the down factory. The steam conditioning method is the only method that will accurately reproduce the original Fill Power of down and feathers regardless of the shipping, compression or other handling.

Usable Fill Power
The usable Fill Power is a very difficult value to determine. Many factors influence the usable Fill Power. Some factors outside of the filling include:

- Filling Density of the finished product
- Product construction
- Fabric type
- Use of additional fabric covers for duvets and pillows.

哪一种还原方法最为精确？

这个问题问到了点子上。答案分为两个部分。

原始蓬松度值
原始蓬松度值是指羽绒在工厂清洗之后立即测试的结果。在羽绒羽毛受到长途运输、挤压或其它处理的影响后，日本蒸汽还原法是唯一的一种能够成功再现羽绒“原始蓬松度值”的检测方法。

可用蓬松度值
受到诸多因素的影响，可用蓬松度值是一种很难鉴定得出的数值。除填充材料外，影响可用蓬松度值的外部因素包括：

- 产品内部填充材料的实际填充密度
- 产品结构
- 织物类型
- 被子和枕头额外的套子

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

The following chart outlines the reliability of three conditioning methods for determining original fill power and "usable" fill power.

Conditioning Method	*Evaluation of Accuracy for Testing Original Fill Power*	*Evaluation of Accuracy for testing Usable Fill Power*
No Conditioning	Down Processing Factory normally uses no conditioning when measuring fill power after washing and sorting. "No conditioning" will never give accurate original fill power values after shipping.	"No conditioning" will give an accurate usable fill power for any point in time. However, the fill power value will change dependent on climate conditions and use of the product. Without conditioning, fill power is always a changing value and never reproducible
Oven Heating Conditiong (Chinese GBT method)	This method will not give accurate original fill power values.	This method gives similar results as Box Conditioning. In some cases results are lower. This method might give a "usable" fill power before customer use. The heating method allows a shorter conditioning period before testing is completed.
Box Conditioning Method	This method will not give accurate original fill power especially if the product has been compressed.	Box conditioning might give a "usable" fill power before customer use. However, the method will not give an accurate reading of fill power after a customer sleeps under the duvet or in the sleeping bag. The fill power reading can vary depending on how the product was shipped and handled before testing.

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

以下图表概括说明了三种检测方法在测定产品的“原始蓬松度值”和“可用蓬松度值”方面的准确性、可靠性。

检测方式	对“原始蓬松度值”的检测精确性的评估	对“可用蓬松度值”的检测精确性的评估
原始检测法	通常情况下，羽绒羽毛加工商、处理商在完成对羽绒和羽毛的清洁和分类后，会立即采用原始检测法对羽绒羽毛进行蓬松度检测。 羽绒羽毛装运后，“原始检测法”将始终无法精确测定羽绒和羽毛的“原始蓬松度值”。	无论在何时，“原始检测法”都能够准确地检测出产品的“可用蓬松度值”。但其检测结果会受到气候环境条件和产品使用程度的影响。 若不设定适当的检测条件，蓬松度值将一直不断地发生变化并且绝对无法再现。
烘箱加热法（中国标准即 GB/T 标准）	该检测方法无法提供准确的“原始蓬松度值”。	该检测方法测定的结果与普通还原法所测定的结果相似。在某些情况下，该检测方法测定的数据略低。 倘若产品尚未被消费者所使用，那么该检测方法有可能检测出产品的 “可用蓬松度值”。 加热法能够在检测结束前创造出一段持续时间较短的条件调节期。
普通还原法	该检测方法无法准确的再现羽绒产品，尤其是被挤压过的产品的“原始蓬松度值”。	倘若产品尚未被消费者所使用，那么该检测方法有可能准确检测出产品的 “可用蓬松度值”。 然而，倘若产品（如棉被或睡袋）已经被消费者所使用，那么该检测方法将无法准确检测出产品的“可用蓬松度值”。 产品在检测前所经历的运输情况和操作情况将影响产品“可用蓬松度值”的测定。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

The following chart compares the reliability of Tumble Dry, Water Rinse and Steam Conditioning to determine both original Fill Power and "usable" Fill Power.

Conditioning Method	*Evaluation of Accuracy for Testing Original Fill Power*	*Evaluation of Accuracy for testing Usable Fill Power*
Tumble Dry	Tumble Dry fill power tests will give a result much closer to original fill power than Box Conditioning. Tumble Dry gives close to original fill power results for bedding products that have not been compressed during shipment. Tumble Dry gives less than the original fill power results for compressed bedding products and most jackets and sleeping bags.	Tumble dry is a good indicator of "usable" fill power. The tumbling with a damp cloth simulates customer effect on down during use (sleeping or wearing a jacket). However, IDFL research on thousands of samples shows that Tumble Dry gives different results on identical products which have been held under different storage conditions (humidity, compression) for an extended period of time. For example, if a company washes a jacket before sending it to a testing lab – the tumble dry fill power result will be higher than for the same jacket sent to the testing lab unwashed. The repeatability of fill power measured on different products with comparable filling materials is much better than box conditioning. However tumble dry can be manipulated by the handling of a product before arriving at the testing laboratory. Tumble dry fill power favors products made locally, compared with overseas shipments (even if down filling is identical.)
Water Rinse	The Water Rinse method gives a fill power value that matches very close to the original fill power.	The Water Rinse method gives an accurate "usable" fill power value for a product that matches the fill power after a customer washes and cleans a down and feather product.
Steam	The Steam Conditioning method is the most accurate method to determine the original fill power value. (Original Fill Power is the fill power test completed by the down processing factory immediately after washing and sorting.)	The Steam Conditioning method gives an accurate "usable" fill power that matches fill power tested after a finished product is cleaned and washed. The question still remains: **Does tumble dry or steam conditioning give the most accurate "usable" fill power during customer use? The answer to this question is still open.** Steam conditioning gives a more consistent result regardless of product handling before sending to the test lab. Although tumble dry fill power may better reflect the actual consumer experience, values can be manipulated by different handling of products before sending to the test lab. (See next page for additional information)

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

以下图表就滚动烘干还原法、水洗还原法和蒸汽还原法在测定产品的“原始蓬松度值”和“可用蓬松度值”方面的准确性、可靠性进行了比较。

检测方式	对“原始蓬松度值”的检测精确性的评估	对“可用蓬松度值”的检测精确性的评估
滚动烘干还原法	相比普通还原法，滚动烘干还原法的检测结果更为接近“原始蓬松度值”。 倘若所检测的是在运输过程中并未受到挤压的床上用品，那么滚动烘干还原法能够提供接近“原始蓬松度值”的检测数据。 若所检测的产品是受到挤压的床上用品或大多数夹克及睡袋，那么滚动烘干还原法的检测数据将小于“原始蓬松度值”。	滚动烘干还原法能够很好的检测出产品的“可用蓬松度值”。滚动烘干还原法将湿透的布料放入圆筒中进行翻滚，模拟的是消费者使用产品的具体行为对羽绒所施加的影响（例如消费者盖棉被睡觉或穿羽绒夹克等使用行为） 然而，国际羽绒羽毛检测实验室（IDFL）通过对数千样品的检测试验后发现，同样一种产品在不同的贮藏环境（湿度、压力）下存放一定时间后，使用滚动烘干还原法对这些产品进行检测，测定结果各不相同。 例如，某企业寄送至实验室的检测样品是一件未清洗的羽绒夹克，工作人员使用滚动烘干还原法对这件未清洗的的羽绒夹克进行检测，得出检测数据 A；同样是这件羽绒夹克，但是该企业在寄送前对该羽绒夹克进行了清洗，即寄送至实验室的检测样品是同一件但经过清洗的羽绒夹克，工作人员也使用滚动烘干还原法对这件经过清洗的的羽绒夹克进行检测，得出检测数据 B。经比较，检测数据 A 将低于检测数据 B。 倘若对由不同填充材料制成的不同产品进行蓬松度检测，那么相比于普通还原法，滚动烘干还原法能够更为精确地反映出不同产品在蓬松度方面的差异。然而，检测样品在抵达检测实验室之前所经受的各种操作因素将有可能影响到滚动烘干还原法的测定结果。 即使羽绒填充材料完全一致，相比于检测跨国运输的产品，滚动烘干还原法更适合被用于检测本地或本国制造的产品，其检测精确性较高。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

水洗还原法	通过水洗还原法所得出的检测数值非常接近于“原始蓬松度值”。	水洗还原法能够准确地提供产品的“可用蓬松度值”，该测定数值与产品经过消费者的清洁和清洗后所具有的实际蓬松度值相一致。
蒸汽还原法	蒸汽还原法是目前检测产品“原始蓬松度值”的各种方法中最为精确的一种。 （所谓的“原始蓬松度值”，指的是羽绒加工厂在完成对羽绒羽毛的清洗和分类后，立即对羽绒和羽毛进行蓬松度检测所得出的蓬松度数据。）	蒸汽还原法能够准确地提供制成品的“可用蓬松度值”，该数值与制成品经过消费者的清洁和清洗后所具有的实际蓬松度值相一致。 然而，问题依然存在： **产品在被消费者使用过程中，哪一种检测方法对产品的测定所得出的“可用蓬松度值”最为精确，是滚动烘干还原法还是蒸汽还原法？** **这个问题至今没有答案。** 不论检测样品在抵达检测实验室之前受到何种操作因素的影响，蒸汽还原法都能够提供更为稳定、更为精确的测定结果。 虽然滚动烘干还原法可能能够更好、更真实地模拟出消费者的实际使用经验，但检测样品在抵达检测实验室之前所经受的各种操作因素将有可能影响到滚动烘干还原法的检测结果。 （更多信息请参阅下文）

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

Additional Information for Rating Tumble Dry and Steam Conditioning Methods

Steam Conditioning is the only accurate method to determine the original Fill Power. This test should be done to verify the Fill Power of bulk down purchased from the factory.

Evaluating "usable" Fill Power is more complicated. The following information should be considered when evaluating the conditioning methods:

- Both the Tumble Dry and Steam methods add moisture and heat to the down and feathers.
- Several thousand test results have since proven that Steam conditioning does NOT falsely inflate the Fill Power beyond its natural, original structural value.
- The steaming process "adds" moisture and heat to the down during steaming. The down is immediately revived with warm, dry air. This process simulates the factory washing process of bulk down and the consumer washing of finished down products.
- The Tumble Dry process also "adds" moisture and heat to the down during the tumbling with a damp cloth. The down is moderately "steamed" and revived as the cloth is dried.
- The steam method revives to a steady state as early as 24 hours after conditioning. (IDFL recommends that Steam Fill Power always be tested after 72 hours). The Tumble Dry method requires 72 hours to revive to a steady state.
- The Tumble Dry method can be manipulated by handling of products before shipping to the test lab.
- The Steam method gives similar results regardless of the handling of the product before arrival at the test laboratory.

有关评估滚动烘干还原法和蒸汽还原法的其他相关信息

就目前而言，蒸汽还原法是唯一一种能够精确再现产品"原始蓬松度值"的蓬松度检测方法。该检测方法旨在检验和核实从工厂所购买的的大宗羽绒羽毛原料毛的初始蓬松度值。
对产品的"可用蓬松度值"进行评估则更为复杂。迄今为止，何种检测方法所提供的"可用蓬松度值"最为准确这一争议尚无最终定论，所以在此之前，各种试验、调查和研究将继续进行直至达成共识。
对各种检测方法进行评估时，应当充分考虑以下信息：

- 无论是滚动烘干还原法还是蒸汽还原法，都向羽绒和羽毛添加了水分和热量
- 成千上万次的检测和试验已成功证实，蒸汽还原法不会改变羽绒或羽毛原始的自然构造，不会引发人为因素从而增大羽绒或羽毛的原始蓬松度。
- 蒸汽还原法在检测过程中通过蒸汽向羽绒或羽毛添加水分和热量。羽绒在温暖干燥的风力的吹拂下，能够立刻恢复活力。该检测方法模拟的是羽绒加工厂对大宗羽绒原料毛进行的清洁和消费者对羽绒制成品进行的清洗。
- 滚动烘干还原法在检测过程中，通过将湿透的布料放入圆筒进行翻滚从而向羽绒或羽毛添加水分和热量。这样做能够确保羽绒适度地吸收水分，在布料被烘干时，羽绒也能够随之恢复活力。
- 倘若使用蒸汽还原法，那么只需经过 24 小时，羽绒即可恢复活力并处于恒稳阶段；如果使用滚动烘干还原法，那么则需要 72 个小时，羽绒才可恢复活力并处于恒稳阶段。
- 不论是滚动烘干还原法还是蒸汽还原法，一经使用，产品的蓬松度值将在较长的一段时间内保持恒稳状态。国际羽绒羽毛检测实验室（IDFL）在对产品使用检测方法几个月后，对产品的蓬松度值再次进行了检测，该测定数据略微低于几个月前的测定数据
- 倘若采用滚动烘干还原法，则检测样品在抵达检测实验室之前所经受的各种操作因素将有可能影响到其测定结果。
- 倘若采用蒸汽还原法，不论检测样品在抵达检测实验室之前受到何种操作因素的影响，蒸汽还原法都能够提供更为稳定、更为精确的测定结果。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com

Evaluation of Fill Power Conditioning Methods
蓬松度还原方法的评估说明

Conclusions

Steam Conditioning is the only consistent, reproducible method of determining the original Fill Power.
The official IDFB method is designed to determine original Fill Power.

"Usable" Fill Power is more complex and depends on the product construction and other external factors.

Tumble Dry is supported by some organizations as giving more accurate "usable" Fill Power. However, Fill Power results using Tumble Dry can be manipulated by handling of the product before sending to the lab.

Even though IDFL developed the Tumble Dry method, IDFL supports the Japanese-developed Steam Method as the basis for determining accurate, consistent Fill Power.

The Steam Conditioning method gives the most consistent Fill Power result and is therefore the best method to determine both original and usable Fill Power.

结论

就目前而言，蒸汽还原法是唯一一种可靠的、能够精确再现产品"**原始蓬松度值**"的蓬松度检测方法。国际羽绒羽毛局（IDFB）官方检测标准旨在科学地、准确地测算产品的"原始蓬松度值"。
有关"可用蓬松度值"的争议错综复杂，迄今为止尚无定论。他会随着产品结构和其他外界因素的影响而变化。
很多组织都支持滚动烘干还原方法测定可用蓬松度，因为其更加精确。然而，使用滚动烘干还原方法测定的可用蓬松度值可以在样品送至实验室之前被认为的操控。

即使滚动烘干还原法是由美国羽绒羽毛检测实验室（IDFL）发明的，国际羽绒羽毛检测实验室（IDFL）仍然支持将日本人发明的蒸汽还原法作为测定"可用蓬松度值"的基本依据。

由于目前为止蒸汽还原法能够测出持续稳定的蓬松度值，我们认为蒸汽还原法是测定可用蓬松度值和原始蓬松度值的最好的还原方法。

IDFL
Tel: +1 801 467 7611
email: info@idfl.com

IDFL EUROPE
Tel: +41 52 765 1574
email: europe@idfl.com

IDFL CHINA
Tel: +86 571 8273 6561
email: china@idfl.com