

E-COMMERCE WITH SERVING MANUFACTURING KNOW-HOW FOR GLASS FIBERS

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ABSTRACT

In conventional E-commerce system, only plain product information is supplied via Internet. However, if we can supply also technical support, it will become the next generation E-commerce. Glass fiber industry is limited society with less open material data. To promote the sales of secondary raw material for glass fiber industry, we are developing an E-commerce system which can supply technical information and support design of glass fiber products. The system supports physical/chemical information, material design technique, and quality evaluation of manufacturing technique and products. These are going be connected to the CHN International Electronic Accounting and Distribution System.

KEYWORDS: E-commerce, Glass fiber, Secondary raw material, Manufacturing know-how, Design support

1. INTROUCTION – FIBER INDUSTRY

Fiber glass is an special limited industry having not so much of market and few opened precise information materials inspite of having high level of technology. Fig.1 shows the world market size of glass fibers originally investigated by NBL Co., Ltd. Though about ten years ago, US, Japan, and Europe occupied almost market, presently are caught up with developing countries, and center of production has been moving to Southeast Asia as shown in Fig.2.

Between these ten years the most grown up country is China, and they are producing glass fiber goods all-roundly as shown in Fig.3, whose amount of product is growing 40-50%/year as shown in Fig.4. They became top of the world in

**World production of
glass fibers in 2007 (by NBL)**

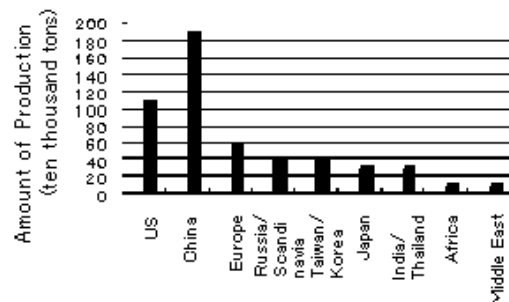


Fig.1: World market size of glass fibers.

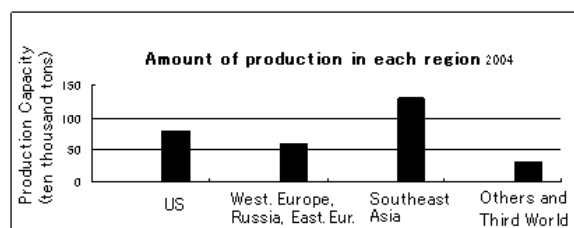


Fig.2 Regional amount of production
(research by NBL Co., Ltd).

2006, and we feel their energy possibly occupying 75% of world share in 2009. As shown in Fig.5, the main raw materials of glass fiber is non-organic materials easy to supply locally and chemical materials (secondary materials) necessary for the manufacturing are exported from advanced countries as well as the facilities. Capacity of the Chinese market of the secondary materials is several ten thousand tons as shown in Fig.6, or 100 million US\$ as shown in Fig.7, and its world market is three times.

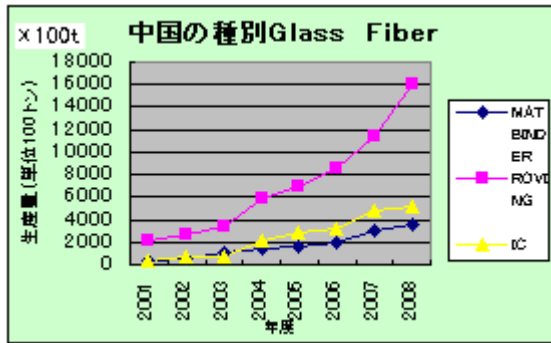


Fig.3: Amount of each kind of product (by NBL).

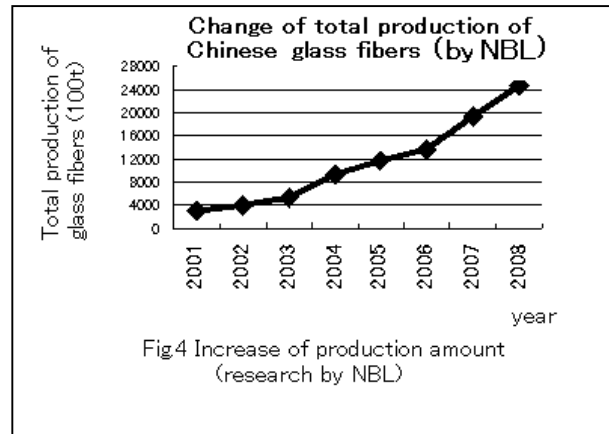


Fig4 Increase of production amount (research by NBL)

3.1 Raw Material

生産素材の組成基準を表示する。基準はロット毎に検査する。

Table 04 E-Glass素材構成の基準例

SiO ₂	54.0±1 (%)	NaO	3.0 (%)以下
B ₂ O ₃	7.5±1 (%)	FeO ₃	0.5 (%)以下
Al ₂ O ₃	14.0±1 (%)	TiO ₂	0.5 (%)以下
CaO	22.5±1 (%)	FeO	0.15 (%)以下
K ₂ O+Na ₂ O	0.8 (%)以下	(E-Glass Standard)	

Fig5 Main raw materials of glass fibers (research by NBL)

We, NBL Co., Ltd, succeeded the engineering service business including providing technical know-how for the manufacturing aiming selling the secondary materials to these market by utilizing IT [1], made sure of 10 % world share (about 50% Chinese share) in the glass fiber market, and made firm inroads into the foreign market.

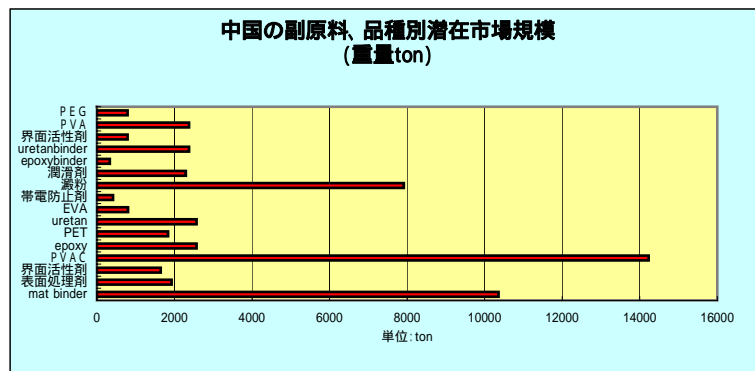


Fig.6: Chinese market capacity of secondary raw materials of glass fibers (research by NBL; 2007).

These research results are presented in this conference.

2. COMMON BASIC KNOWLEDGE

Since fiber glass industry is small and the number of committing engineers is not so many, there exist few technological information materials and even more its technological contents are not opened so much. In such situations, if we can sell necessary secondary materials and products via internet under the conditions of providing techniques including patents, we can obtain profit in the technical service business, and we can construct a new business model with high competitive power. The first step is providing users the above world market information. The 2nd step for such technical information is the basic technological knowledge of such as chemical and physical basic experiments shown in Fig.8 and 9.

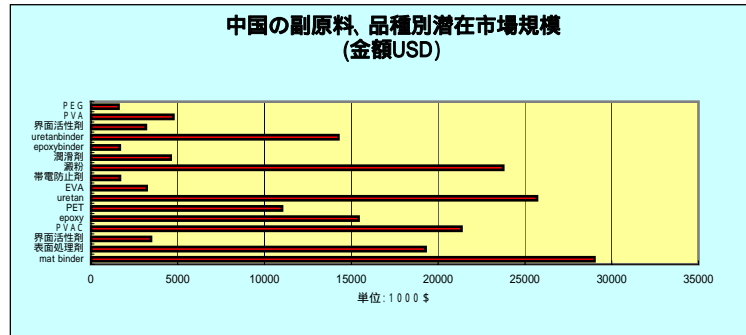


Fig.7: Market capacity of secondary raw materials (by NBL).

1 FIBER GLASS 生産のための副原料の選定方法
 Selection method of secondary materials for fiber glass production

[Q1: 選択された副原料が混合調査できるか?]
 Can the selected material combined?

1. 1 集束剤の混合実験
 (1) 配合手順の試験方法 mixing experiment

ガラス板 (300mm角) + ガラス棒 (6~10mmφ)

ガラス板上でうすくひきのばす。何回か順番に添加して混合していく。この時温度に注意する事 (実際の温度に近い条件でテスト)

(2) 判定
 般に手順は1水、2表面処理助剤、3表面処理剤、4乳化剤、5柔軟剤、6油剤帯電防止剤、7接着剤の方法と、1の次に7を用いる方法などがある。手順を仮定して、順に摺り混ぜると、完全に混合できない時はコロイド状(ゼリー状)やつぶ状の不完全混合が発生する。この時は混合は不完全であり、対策を必要とする。

(3) 合格状態
 「A1: ガラス面をとおして、接着剤がふんばく均一になっっている事。」

(参考: ファイバー生産設備)
 一般にメルト方式で線径1500μmから2000μm/分の条件下で1000kgのファイバーを生産するには、約330kgの乾燥性集束剤(サイジング材とも呼ぶ)を使用。サイジング材中の潤滑剤成分(集束材成分とも呼ぶ)は3.5%から7%、ファイバーに付着させる乾燥集束材(付着率とも呼ぶ)は0.4%から1.2%である。使用サイジング材の潤滑剤と付着率の関係(歩留まり)は、約30%から70%である。なお、使用サイジング材(集束材)の割合は、必ず潤滑剤が10%の高湿エマルジョン(厚塗り)であり、生産時に混合する。

Fig.8 Basic technique of chemistry (from NBL Net Service).

3. BASIC KNOWLEDGE OF FIBER MANUFACTURING

Explaining detail of basic theory of manufacturing and designing glass fiber, and providing for each product whole technical contents necessary for designing each product are provided as the 3rd step. The basic structure of glass fiber for electronics board is shown in Fig.10, and its enlarged fiber structure is shown in Fig.11. By providing unopened technical contents via Internet, we can serve specific users. Concerning design of the secondary raw material, research results of NBL are also explained from total view point as shown in Fig.12.

7 接着状態の強度理論近似計算

[Q12: 集束材の強度はどのように計算されるか?]
 集束剤の接着は接着剤の粒子(0.03D)が0.4~2wt%一般に使用されていると考える。その粒子はランダムにファイバー間にある。(接触部)この粒子の乾燥によりガラスフィラメントが接着する。この考え方をモデルにすれば左記となろう。

必要接着力は
 ① はり応力(剪断力)
 ② 曲げ剛性

であり、絶対値は解析が複雑であるので相似則を用いて必要接着力の設計方法を導く。
 ①②モデル図から接着点の平均長さが相似則の最大の要因と理解されよう。Lは必要接着剤の量と径により近似できる。

(剪断力)

$$\tau = n\sigma \dots\dots (1) \quad \text{ここで } \sigma: \text{一点当りの接着力}$$

$$n: \text{点数(単位長さ当り)}$$
 接触は断面モデルから6接触とするとnは接着剤の必要wt%を w_t とすると、接着剤の量Wはガラス密度 ρ_g 、接着剤密度 ρ_B

$$W = W_t \times (\pi/4)(D^2) \times L \times \rho_B \dots\dots (2)$$

$$n = W / ((3/4)(d^3)(\rho_B)) \dots\dots (3)$$
 (1)(2)式よりLを導く(n=6の時)

$$W_t \times (\pi/4)(D^2) \times L \times \rho_B = n \times (3/4)(d^3)(\rho_B)$$

$$L = 3nd^3 \rho_B / (\pi W_t D^2 \rho_B) = 18d^3 \rho_B / (\pi W_t D^2 \rho_B) \dots\dots (4)$$

状態モデル
 断面モデル
 立体モデル
 平面力学モデル

Fig.9: Basic technique of physics (from NBL Net Service).

4. BASIC TECHNOLOGY OF SECONDARY RAW MATERIAL

The necessary secondary raw material for fibers is starch, and there are two kinds of method for making it paste. They are method of heating and combining by open cooker called Japanese style as shown in Fig. 13, and jet cooker method called American style. In the net, cooking conditions and managing standards are also explained in detail as shown in Fig.14. Jet cooker is also explained in detail including manufacturing condition as shown in Fig.15. Fig.16 shows an example of the manufacturing combining condition for the jet cooker. Fig.17 shows explaining in detail about quality of the pasted starch.

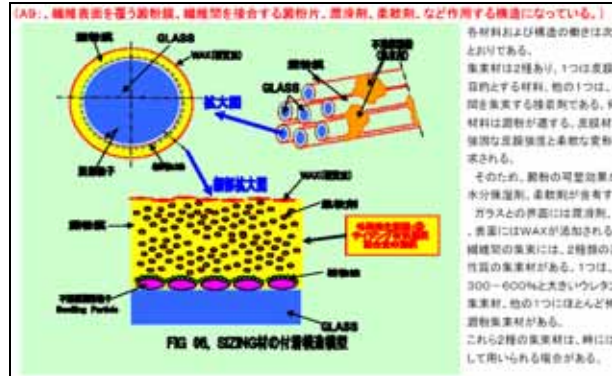
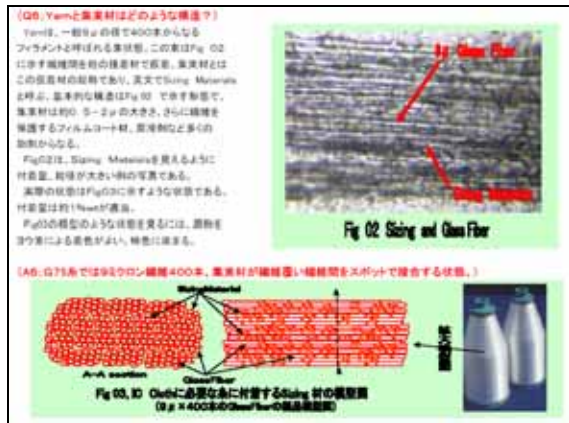


Fig.10: Basic structure of glass fiber (NBL Net Service)

Fig.11: Enlarged fiber structure (from NBL Net Service).

Table 2-1: Secondary Raw Materials

No.	Material	Content	Function
1	Starch	2.5-3%	Water-soluble starch, used for thickening, stabilizing, and emulsifying.
2	Surfactant	~0.2%	Large molecules, used for emulsification and stabilization.
3	Surfactant emulsifier	~0.2%	Used for emulsification and stabilization.
4	Emulsifier	0.2-0.5%	Used for emulsification and stabilization.
5	Starch	0-0.2%	Used for thickening and stabilization.
6	Starch	~0.005%	Used for thickening and stabilization.
7	Starch	0-1.3%	Used for thickening and stabilization.
8	Starch	0.001%	Used for thickening and stabilization.

Fig.12: Constitution of secondary raw materials for glass fibers (from NBL Net Service).

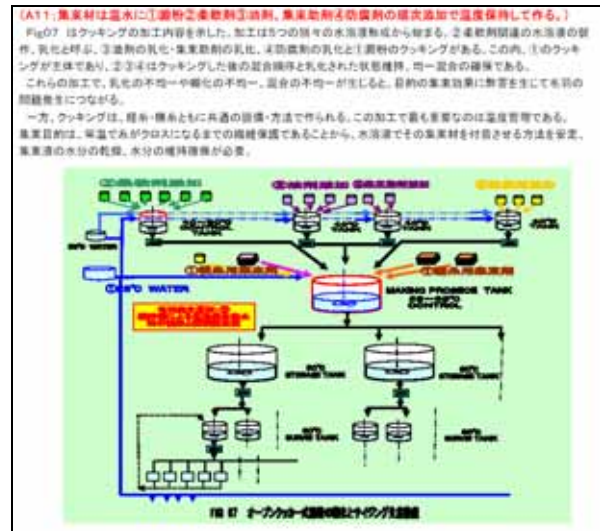


Fig.13: Open cooker (from NBL Net Service).

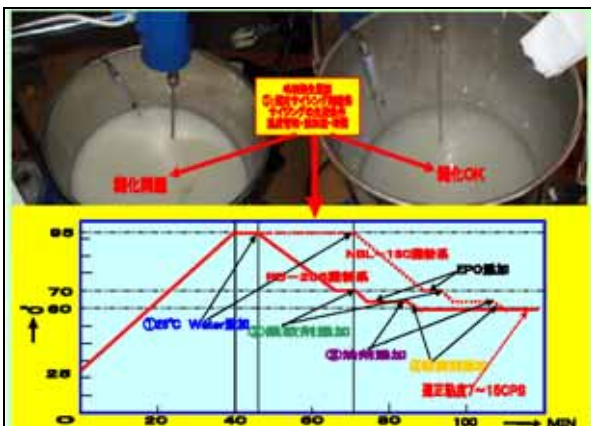


Fig.14 Cooking condition of open cooker (from NBL Net Service).

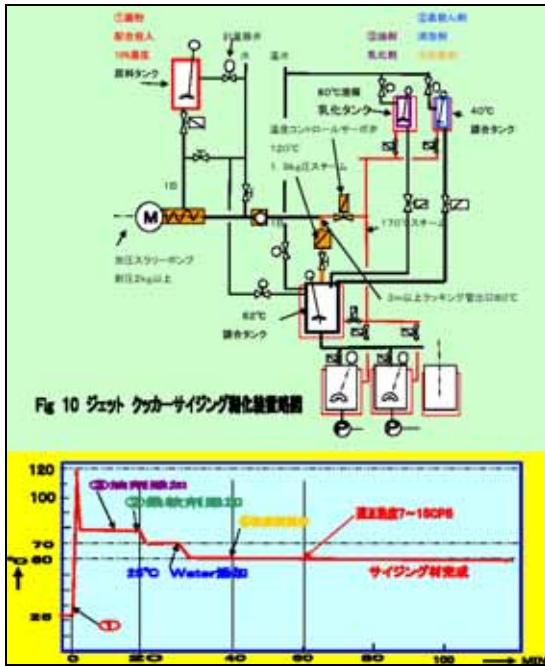


Fig.15 Jet cooker (from NBL Net Service).

5. QUARITY CONTROL OF PRODUCT

In manufacturing glass fibers, we need a lot of know-how. As an example, we provide via Internet. Fig.18 shows major points related to the quality of product. Fig.19 shows explanation of cause of occurring fluff. Fig.20 shows explanation of where and why occurring fluff in the process. Also the causes and points of occurring fluff of yarn are explained as shown in Fig.21.

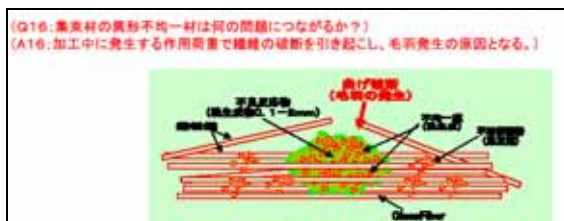


Fig.18: Points related to product quality (from NBL Net Service).

操作手順	薬名	重量(KG)	添加率(%)	組成率(%)
高圧噴射温度 100℃	HAS-Body PD-2050B	23.0	1.91	21.1
	HAS-Body S-210D	23.0	1.90	21.0
	PVA	0.0	0	0.0
	計量	290.0		
重量 450KG 70→75℃へ冷却	Total (10%濃度)	440.0		49.1
冷水添加 80℃へ冷却	Solignum GP-1	16.0	1.90	21.1
	Solignum GP-1	2.4	0.24	2.1
	計量 (80℃)	80.0		
	計量	80.0		
	10%濃度	240.0		
② 140 OKG 40→50℃	PEG-800	1.2	0.12	1.1
	Solignum GW-1B(30%)	8.0	0.24	2.1
③ 70 OKG	計量 (1%濃度)	60.0		
	計量	60.0		
④ 4 OKG	Proxecto Agent	0.25	0.04	0.4
	計量	2.00		
⑤	添加剤 TSA-727	4.00	0.08	0.08
	計量	4.00		
⑥+⑦ 120KG程度 62℃保温槽10→50℃	計量	1200.0	0.12	100

Fig.16 Combining condition of jet cooker (from NBL Net Service).

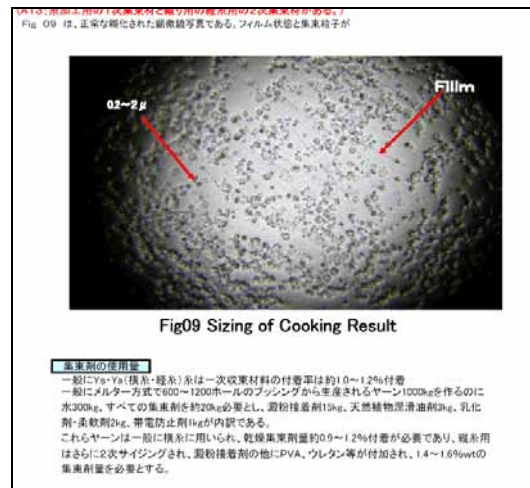


Fig09 Sizing of Cooking Result

【集束剤の使用量】
 一般にYs-Ya(積糸・粒糸)糸は一次収束材の付着率は約1.0~1.2%付着
 一般にメルト方式で600~1200ポールのフッシングから生産されるヤーン100kgを作るのに
 水300kg、すべての集束剤を約20kg必要とし、澱粉接着剤15kg、天然植物系滑油剤3kg、乳化
 剤・柔軟剤2kg、帯電防止剤1kgが内訳である。
 これらヤーンは一般に積糸に用いられ、乾燥集束剤量約0.9~1.2%付着が必要であり、積糸用
 はさらに2次サイジングされ、澱粉接着剤の他にPVA、ウレタン等が付加され、1.4~1.6%wtの
 集束剤量が必要とする。

Fig.17 Quality of pasted starch. (from NBL Net Service).

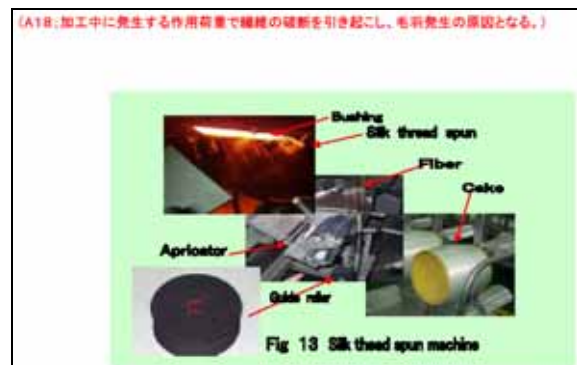


Fig.19: Cause of fluff (from NBL Net Service).

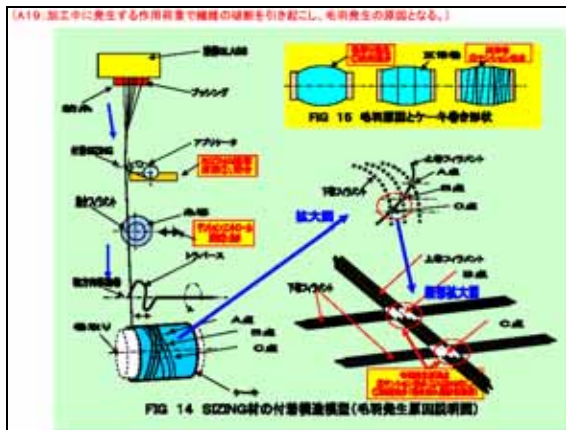


Fig.20 Where and why occurring fluff in manufacturing process (from NBL Net Service).

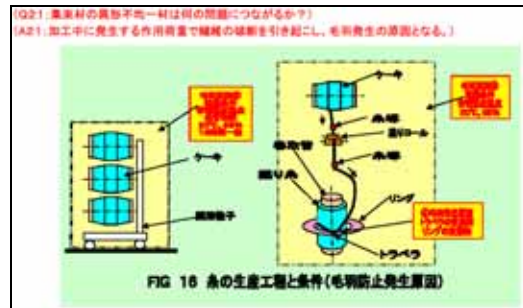


Fig.21 Points of occurring fluff of yarn.

6. PROCESS OF PRODUCING FW ROVING

Fig.22 shows the sizing method of filament winding roving which is the representative product of glass fiber roving. It shows how the fibers passing in emulsion including coupling, lubricant, surfactant, sizing binding materials etc are winded, and then dried up by heating, further melted by heating, and finally processed to roving.

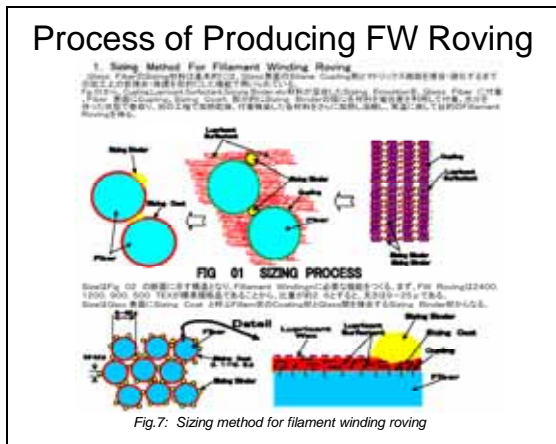


Fig.22: Sizing method for FW roving (from NBL Net Service).

品名	規格	単位	数量	単価	金額	品名	規格	単位	数量	単価	金額
1	Quintara	2000000	100	1000000	100000000	2	Quintara	2000000	100	1000000	100000000
3	Quintara	2000000	100	1000000	100000000	4	Quintara	2000000	100	1000000	100000000
5	Quintara	2000000	100	1000000	100000000	6	Quintara	2000000	100	1000000	100000000
7	Quintara	2000000	100	1000000	100000000	8	Quintara	2000000	100	1000000	100000000
9	Quintara	2000000	100	1000000	100000000	10	Quintara	2000000	100	1000000	100000000
11	Quintara	2000000	100	1000000	100000000	12	Quintara	2000000	100	1000000	100000000
13	Quintara	2000000	100	1000000	100000000	14	Quintara	2000000	100	1000000	100000000
15	Quintara	2000000	100	1000000	100000000	16	Quintara	2000000	100	1000000	100000000
17	Quintara	2000000	100	1000000	100000000	18	Quintara	2000000	100	1000000	100000000
19	Quintara	2000000	100	1000000	100000000	20	Quintara	2000000	100	1000000	100000000
21	Quintara	2000000	100	1000000	100000000	22	Quintara	2000000	100	1000000	100000000
23	Quintara	2000000	100	1000000	100000000	24	Quintara	2000000	100	1000000	100000000
25	Quintara	2000000	100	1000000	100000000	26	Quintara	2000000	100	1000000	100000000
27	Quintara	2000000	100	1000000	100000000	28	Quintara	2000000	100	1000000	100000000
29	Quintara	2000000	100	1000000	100000000	30	Quintara	2000000	100	1000000	100000000
31	Quintara	2000000	100	1000000	100000000	32	Quintara	2000000	100	1000000	100000000
33	Quintara	2000000	100	1000000	100000000	34	Quintara	2000000	100	1000000	100000000
35	Quintara	2000000	100	1000000	100000000	36	Quintara	2000000	100	1000000	100000000
37	Quintara	2000000	100	1000000	100000000	38	Quintara	2000000	100	1000000	100000000
39	Quintara	2000000	100	1000000	100000000	40	Quintara	2000000	100	1000000	100000000
41	Quintara	2000000	100	1000000	100000000	42	Quintara	2000000	100	1000000	100000000
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45	Quintara	2000000	100	1000000	100000000	46	Quintara	2000000	100	1000000	100000000
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53	Quintara	2000000	100	1000000	100000000	54	Quintara	2000000	100	1000000	100000000
55	Quintara	2000000	100	1000000	100000000	56	Quintara	2000000	100	1000000	100000000
57	Quintara	2000000	100	1000000	100000000	58	Quintara	2000000	100	1000000	100000000
59	Quintara	2000000	100	1000000	100000000	60	Quintara	2000000	100	1000000	100000000
61	Quintara	2000000	100	1000000	100000000	62	Quintara	2000000	100	1000000	100000000
63	Quintara	2000000	100	1000000	100000000	64	Quintara	2000000	100	1000000	100000000
65	Quintara	2000000	100	1000000	100000000	66	Quintara	2000000	100	1000000	100000000
67	Quintara	2000000	100	1000000	100000000	68	Quintara	2000000	100	1000000	100000000
69	Quintara	2000000	100	1000000	100000000	70	Quintara	2000000	100	1000000	100000000
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73	Quintara	2000000	100	1000000	100000000	74	Quintara	2000000	100	1000000	100000000
75	Quintara	2000000	100	1000000	100000000	76	Quintara	2000000	100	1000000	100000000
77	Quintara	2000000	100	1000000	100000000	78	Quintara	2000000	100	1000000	100000000
79	Quintara	2000000	100	1000000	100000000	80	Quintara	2000000	100	1000000	100000000
81	Quintara	2000000	100	1000000	100000000	82	Quintara	2000000	100	1000000	100000000
83	Quintara	2000000	100	1000000	100000000	84	Quintara	2000000	100	1000000	100000000
85	Quintara	2000000	100	1000000	100000000	86	Quintara	2000000	100	1000000	100000000
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93	Quintara	2000000	100	1000000	100000000	94	Quintara	2000000	100	1000000	100000000
95	Quintara	2000000	100	1000000	100000000	96	Quintara	2000000	100	1000000	100000000
97	Quintara	2000000	100	1000000	100000000	98	Quintara	2000000	100	1000000	100000000
99	Quintara	2000000	100	1000000	100000000	100	Quintara	2000000	100	1000000	100000000
合計			100	1000000	100000000				100	1000000	100000000

Fig.23: Design support for secondary raw materials for FW (from NBL Net Service).

7. DESIGN/COMBINATION SERVICE OF SECONDARY RAW MATERIALS

Network supports the necessary basic physical calculations as shown in Fig.23. Thus the network can supports all the design for manufacturing. Quality standard is very important in the E-commerce with customers from different areas/countries. Therefore, the network supplies detailed quality standard for the products. Fig.24 shows an example of quality standard of secondary raw material for FW (Filament Winding method for pipe manufacturing). Fig.25 shows an example of quality standard of glass fiber products for FW.

Coupling	一般FRP	KRMA003	103	約12-20	一般FRP用リエストール
	製管FRP	KRMA755	104		耐高湿水、高温用適当
	製管FRP	KRMA403	102		工事用、ビル用、パイプ用
	FRTP	KRMA903	101		耐火性樹脂用
Resin	PET	NBL-42	314	約60-90	一般FW用PET、高耐熱型
		NextLea300	328		一般FW用PET、高耐熱型
		Superflex300	301		一般FW用PET、EM、
		Superflex381	301		一般FW用PET、耐熱、EM
	PET/EPO	A-09	318		EPOXY/PET混合樹脂
		NBL-70	319		828型EM
	EPO	KE-002	345		828型EM
		KE-116	345		836型EM
		KE-301C	348		耐熱型、1002型EM
		H-1022	350		耐熱型、1001型EM
	E-102		304		透明型、1001型EM
		KE-307-2	383		耐熱型、1002型EM
	URETHAN	NBL-50	318		RP用ウレタンSOPHENA、SM20%系
		NBL-07	306		耐熱型、1001型EM
EVA	NBL-05843	232	耐熱型、1001型EM		
	GM-6000	230	SM100%系樹脂、一般用		
EVA	NBL-43	205	SM100%系樹脂、高弾性高引		
	NBL-00862	710	一般「Mat」も使用可能		
PVA	GH-20	812	IC クロス剤		
	RA-10	813	IC クロス剤		
Lubricant	Paraffin Oil	K-4300	807	約10-30	パラフィンオイル、乳化剤混入
		Quick Paraffin	809		パラフィンオイル
		DSP	808		
Softener	Amide	GW-18	803	約8-20	EPOXY 硬体化剤
		KP-10	822		EPOXY 硬体化剤
		SPF-30	814		EPOXY 硬体化剤
Silicon Oil	NBL-371	825	約0-5	遮光剤、遮光剤 KL-543混濁	
		818			
Dye	470	818	約0-5		
		820			
Hardener	HAC	820	約0-5		
		820			
LOI(貯蔵量): 約0.4%					

3.2 Standard of GD and NBL Specification(A-AAA)
Table 05 FW Roving 規格と品質等級の対照例

項目No.	項目名	2400TEX規格(大径糸圧縮仕様)				1200TEX規格(内圧縮仕様)			
		規格値	Δ%	Δ%	Δ%	規格値	Δ%	Δ%	Δ%
1	FeContent%	0.2以下	0.08	0.05	0.03	0.2以下	0.08	0.05	0.03
2	Impurity	0.5以下	0.45	0.4	0.35	0.5以下	0.45	0.4	0.35
3	Impurity	0.5以下	0.45	0.4	0.35	0.5以下	0.45	0.4	0.35
4	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±
5	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±
6	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±
7	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±
8	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±
9	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±
10	Strength	2400±	2400±	2400±	2400±	1200±	1200±	1200±	1200±

Fig.24: Quality standard of secondary raw materials for FW (from NBL Net Service).

Fig.25: Quality standard of glass fiber products.

8. BASIS OF MANUFACTURING MAT

The system supports also manufacturing process of fiber mat. They also include documents of production technique, optimum production condition, production method in laboratory, and Technical materials provided by the net service are web pages, able to print to the regular document size of A4. Fig.26 shows a format of each technical material, and Fig.27 shows a sample of explaining method in the materials. Also necessary information is provided as in Fig.28. How to determine the optimum manufacturing condition and model of the manufacturing condition are explained as shown in Fig.29. Confirming method in laboratory before manufacturing in the line is explained as shown in Fig.30. Basis of quality of products (Fig.31) and QA of technical explanation (Fig.32) are also provided.

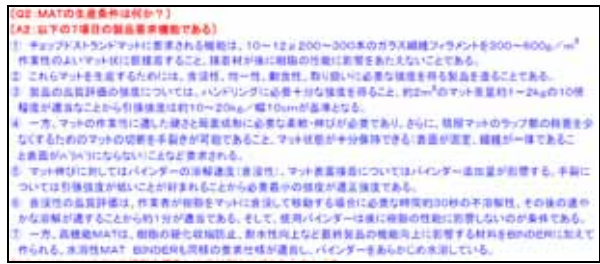


Fig.26: Format of each technical material (from NBL Net Service).

Fig.27 Explaining style in materials

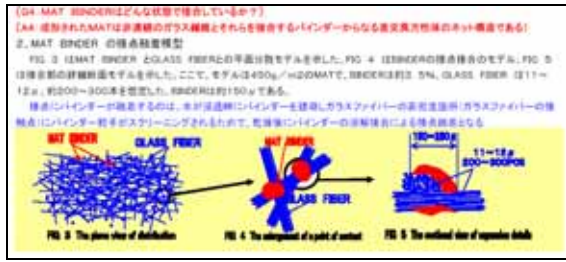
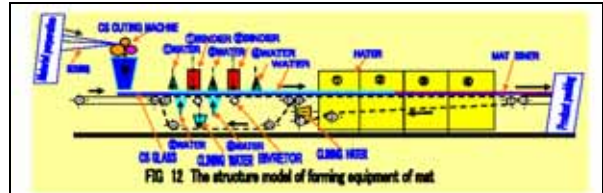


Fig.28: Necessary detailed information (from NBL Net Service).



標準的製造条件・品質管理・品質の保証

TABLE 2

標準的製造条件	品質管理	品質の保証	品質の保証	品質の保証	品質の保証	品質の保証	品質の保証	品質の保証	品質の保証
2000	1100	2000	2000	2000	2000	2000	2000	2000	2000
4500	1100	2000	2000	2000	2000	2000	2000	2000	2000
6000	1100	2000	2000	2000	2000	2000	2000	2000	2000

Fig.29: Optimum manufacturing condition of mat (from NBL Net Service).



Fig.30: Laboratory manufacturing (from NBL Net Service).

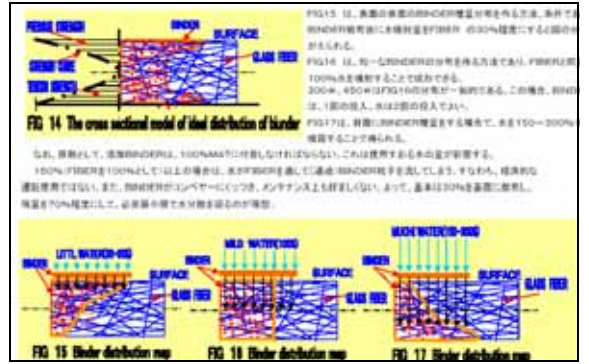


Fig.31: Basis of quality of products.

(1) 正しい機械調整・製造条件で品質の保証は可能であるか?

(2) 製品の品質管理と生産-材料不良との関係で発生する不良原因

不良原因	原因	発生率
繊維が絡まる	原因: 繊維が絡まる	1, 2, 3, 4, 5, 6
繊維が折れる	原因: 繊維が折れる	5, 6
繊維が伸びる	原因: 繊維が伸びる	4, 5, 6
繊維が縮む	原因: 繊維が縮む	4, 5, 6
繊維が壊れる	原因: 繊維が壊れる	4, 5, 6
繊維が溶ける	原因: 繊維が溶ける	4, 5, 6
繊維が燃える	原因: 繊維が燃える	4, 5, 6
繊維が腐る	原因: 繊維が腐る	4, 5, 6
繊維が変色する	原因: 繊維が変色する	4, 5, 6
繊維が変質する	原因: 繊維が変質する	4, 5, 6
繊維が変形する	原因: 繊維が変形する	4, 5, 6
繊維が変位する	原因: 繊維が変位する	4, 5, 6
繊維が変向する	原因: 繊維が変向する	4, 5, 6
繊維が変長する	原因: 繊維が変長する	4, 5, 6
繊維が変径する	原因: 繊維が変径する	4, 5, 6
繊維が変重する	原因: 繊維が変重する	4, 5, 6
繊維が変容する	原因: 繊維が変容する	4, 5, 6
繊維が変質する	原因: 繊維が変質する	4, 5, 6
繊維が変形する	原因: 繊維が変形する	4, 5, 6
繊維が変位する	原因: 繊維が変位する	4, 5, 6
繊維が変向する	原因: 繊維が変向する	4, 5, 6
繊維が変長する	原因: 繊維が変長する	4, 5, 6
繊維が変径する	原因: 繊維が変径する	4, 5, 6
繊維が変重する	原因: 繊維が変重する	4, 5, 6
繊維が変容する	原因: 繊維が変容する	4, 5, 6

Fig.32: QA, technical explanation (from NBL Net Service).

9. OTHER FUNCTIONS

The system also provides commercial information of products including basic quality data of product (Fig.33), compatibility of products (Fig.34), MSDS (Material Safety Data Sheet) for exports (Fig.35), specification of product (Fig.36) which may be used for dealing maker guarantee document, certificate of approval of ISO (Fig.37),

product information (Fig.38), information of packing shape, and information of material makers (Fig.39).

Public presentation: (http://nblao), Business: (http://chn.co.jp)

Submaterials table (NBL collecting)

No.	Code	Product name	Unit	Price	Material	Remarks	Others / Remarks	Agency	Type
180	Coating	epoxyresin	BM1123	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. PE, ACRYL, PG, ABS, PVC, NYLON, MELAMIN, PHENOL, FURAN, EPOXYI	Sho-Etsu	epoxy
181	Coating	epoxyresin	BM200	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP + A-110 (PS, PE, ACRYL, PG, ABS, PVC, NYLON, MELAMIN, PHENOL, FURAN, EPOXY)	Sho-Etsu	A-110 eq.
182	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP + A-107 (ACRYL, URETHANE, PET, ABS, MELAMIN, EPOXYI, FURAN)	Sho-Etsu	A-107 eq.
183	Coating	epoxyresin	BM500	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP + A-114 (PS, PE, PC, PS, ABS, PET, EPOXYI)	Sho-Etsu	A-114 eq.
184	Coating	epoxyresin	BM575	934	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP heat resistance (EPOXYI, PET, URETHANE, PC, MELAMIN)	Sho-Etsu	HS
185	Coating	epoxyresin	BM1000	940	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP (PD, PE)	Sho-Etsu	HS
186	Coating	epoxyresin	BM200	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Sho-Etsu Ep.	Sho-Etsu	HS
187	Coating	Fused Resin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
188	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
189	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
190	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
191	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
192	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
193	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
194	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
195	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
196	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
197	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
198	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
199	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS
200	Coating	epoxyresin	BM400	930	Sho-Etsu Chemical Co., Ltd.	3-epoxydiglycidyletheroxydianhydride	Ep. FFP	Sho-Etsu	HS

Fig.33 Basic quality data of product (from NBL Net Service).

薬劑の互換性 (メーカーと品番) リスト

1. 資料作成目的
本資料は薬劑材料の生産企業各社の同品種で代替可能な同等性能製品 (互換性) を示す。互換性とは、同一目的・使用ができる製品であり、取り替え可能な商品を意味する。参考に分類を下記します。

同等品: 化学的に同じで、製品も互換性があるもの
代替品: ほぼ同一材料で取り替え可能な商品
類似品: 同一用途機能製品

※表外の、ご注文の際に代替可能な商品にして下さい

Fig.34: Compatibility of products (from NBL Net Service).

MATERIAL SAFETY DATA SHEET ALTF090880E

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SECTION I			
MANUFACTURER'S NAME DAIIPPON INK&CHEMICALS, INC.		EMERGENCY TELEPHONE NO. TEL: +81-72-218-3281	
ADDRESS (Company, Street, City, State and Zip Code) 3-7-20, Nishibashi, Chiba-ku, Tokyo, Japan.			
CHEMICAL NAME AND SYNONYMS Polyurethane resin emulsion		TRADE NAME AND SYNONYMS NBL-07	
CHEMICAL FORMULA Synthetic resin		HSN/MSDS Proprietary	
SECTION II - HAZARDOUS INGREDIENTS			
PAINTS, PRESERVATIVES, & SOLVENTS	%	ILSD (GHS)	ALLIED AND METALLIC COATING
STUMETS			SAFETY METAL
CATALYST			ALLOY
VEHICLE			METALLIC CONTAINERS
POLYMER	Ethyl Toluene	09-21 (1)	STEEL METAL
REDUCED	None		HAZ. CORROS. OR OXID. FLUO.
OTHERS	Polyurethane Resin	29-21	OTHERS
None			None
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS OR GASES			%
None			ILSD (GHS)
SECTION III - PHYSICAL DATA			
BOILING POINT (°C)		SPECIFIC GRAVITY (20°C)	

Fig.35: MSDS of secondary raw material (from NBL Net Service).

DIC DAINIPPON INK & CHEMICALS
Chiba Branch
 3-7-20 Nishibashi, Chiba-ku, Chiba-shi, Tokyo 103-8222, Japan
 TEL: +81-72-218-3281 FAX: +81-72-218-3282
 Tokyo R&D Center
 3-1-1 Ichihara, Ichihara-shi, Chiba-shi, Chiba-ken, Japan
 TEL: +81-72-248-3711 FAX: +81-72-248-3853

Water-borne polyurethane resin for glass fiber sizing
NBL-07

NBL-07 is specially designed polyurethane dispersion for glass fiber sizing use.

TYPICAL PROPERTIES

Component	Polyester type polyurethane
Appearance	Milky white aqueous dispersion
Non Volatile (%)	29 - 31
pH	7 - 9
Viscosity (mPa·s)	< 1000
Ionic Charge	Nonionic/Anionic
Volatile Component	Water
Particle Size (µm)	< 5

FILM PROPERTIES

Tensile Strength (MPa)	> 12
------------------------	------

Fig.36: Specification of product including coverage of guarantee (from NBL Net Service).

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

**Dainippon Ink & Chemicals, Inc.
Chiba Plant**
*(including DIC Technology Co., and DIC Logistics Co.)
Ichihara-shi, Chiba-ken,
Japan*

has been approved by Lloyd's Register Quality Assurance Limited to the following Quality Management System Standards:

ISO 9001 : 2000 JIS Q 9001 : 2000

The Quality Management System is applicable to:

Research, development and manufacture of synthetic resins,

Fig.37 Certificate of approval of ISO (from NBL Net Service).

10. CONCLUSIONS

Thus, by providing and supporting combined various technical, commercial, and dealing information/service on the Internet, we can enhance sales by E-commerce. However, smart linkage between each information is always a problem and remained as to be developed.

REFERENCES

[1] Jing Huang, Yoshinori Nishino, Masamitsu Moriyama, and Yingming Chen, "E-commerce system developed by NBL---Technology, material, and selling system for glass fiber production---", *Production Management*, vol.10, No.3, pp.109 - 119, 2004 (in Japanese).

PRODUCT INFORMATION				
2003.4.20 by NBL				
product name		Starch NBL-130		
product maker		Shikibo Ltd		
product use, capacity		sizing material, main material		
chemical component (structure)		corn starch hydroxypropyl ether (starch)		
physical property	item	unit	standard value / test method	
	moisture rate		11.0~13.5 / Infrared moisture meter	
	ash		0.05~0.15 / 600°C, electric furnace	
	P11		6.65~6.94 / 5% suspension, P11 meter	
	viscosity	50°C 10.0~24.0mpas		D85%, 50°C, viscometer
				60°C 13.0~30.0mpas
				50°C 15.0~40.0mpas
status		Light yellow & white powder		
usage	lot determination	one batch/1000~1500kg/one lot		
	meaning of lot number	Ex. A.B123 produced year (A)/month (B)/product number (D)		
	sampling method	take out about 500kg product bag as sample		
	reserved sample	500g		
	test score list	3 sets		
shipping	packing material	with 3 layers of craft paper		
	package indication	product name, container quantity, company name		
	package size	1100 x 1100 x 1900(mm)		
	weight per package	25kg x 4 bags/pallet x 20 pallets/container 2000kg/40 container		
	storage condition	normal temperature, indoors		
	storage period limit	6 months after supplied		
company	manufacturing company	Shikibo LTD.		
	supplier	NBL		
	physical distribution company	NBL		

Fig.38: Product information
(from NBL Net Service)



Fig.39: Introduction of material makers
(from NBL Net Service).