insulation&conductors

Rigid Insulation

Presspahn- Thermally Upgraded Plain Kraft Paper

GENERAL

A significant development in the transformer industry was the introduction of thermally upgraded papers. It was discovered that craft paper treated with chemicals, so as to inhibit the loss of water from the cellulose molecule (not moisture), resisted the effects of heat degradation. Coils made of stabilised papers can carry loads approximately 12-15% higher than ordinary papers.

APPLICATIONS

A significant advantage of thermally upgraded papers is their resistance to loss of physical strength when exposed to elevated temperatures. Plain, untreated paper on the other hand is rapidly dehydrated by heat and suffers drastic reduction of tensile and bursting strength as a result.

CONSTRUCTION

Papers used as layer insulation are typically made on cylinder machines. By virtue of the cylinder method of manufacture, these papers are characterised by their exceptional longitudinal physical strength (machine direction). The paper fibres are oriented so that the resultant product has high resistance to cross tearing, and high tensile strength. These characteristics are essential if the product is to withstand the tension imposed during the coil winding process.
The papers, made on these machines, are composed of multiple fibre layers with the cellulose molecules bonded together, both physically and chemically, by mechanical pressing. This produces a dense, smooth surfaced laminated structure having good dielectric breakdown values. Transformer oils are readily absorbed by cylinder papers, thereby more than doubling their dielectric constant.

PROPERTIES:

Physical							
Thickness	**mm**	**0.075**	**0.125**	**0.175**	**0.25**	**0.38**	**0.5**
Basis Weight	kG per 1000 sq metres (approx.)	76	131	180	261	376	506
Apparent Density				0.9 to 1.1			
Moisture;	%			4.7			
PH Water extract				6.0 to 8.0			
Ash Content;	%			1			
Nitrogen Content (Coleman)	%			1.5 to 2			
Bond Strength Min.	NM^2			0.0058032			
Tear Strength (gram/cm)							
Machine Direction (Length)		23.62	51.18	78.74	118.11	192.91	295.28
Cross Direction (Width)		33.46	62.99	94.49	165.35	267.72	334.65
Tensile Strength (gram/cm)							
Machine Direction (Length)		17.72	31.5	39.37	59.06	78.74	98.43
Cross Direction (Width)		7.87	9.84	11.81	19.69	31.5	47.24
Burst Strength; Mullen		0.006529	0.012332	0.01741	0.02539	0.0399	0.047876
Electrical							
Dielectric Breakdown	Volts (dry)	900	1300	1700	2100	2900	3300
Dielectric Breakdown	Volts (oil)	5500	8500	10500	14000	20000	23500

020911_Presspahn_0710v3

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