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APPENDIX

Table A.1 Classification of Adhesives

Origin and basic type		Adhesive material	
	Animal		Albumen, animal glue (inc. fish), casein, shellac, beeswax
	Vegetable	Natural resins	(gum arabic, tragacanth, colophony, Canada balsam, etc.); oils and waxes (carnauba wax, linseed oils); proteins (soyabean); carbohydrates (starch, dextrines)
Natural	Mineral	Inorganic materials	(silicates, magnesia, phosphates, litharge, sulphur, etc.); mineral waxes (paraffin); mineral resins (copal, amber); bitumen (inc. asphalt).
Synthetic	Elastomers	Natural rubber	(and derivatives, chlorinated rubber, cyclised rubber, rubber hydrochloride)

Origin and basic type	Adhesive material
Synthetic rubbers and derivatives	(butyl, polyisobutylene, polybutadiene blends (inc. styrene and acrylonitrile), polyisoprenes, polychloroprene, polyurethane, silicone, polysulphide, polyolefins (ethylene vinyl chloride, ethylene polypropylene))
Reclaim rubbers	
Thermoplastic	Cellulose derivatives (acetate, acetate-butyrate, caprate, nitrate, methyl cellulose, hydroxy ethyl cellulose, ethyl cellulose, carboxy methyl cellulose)
Vinyl polymers and copolymers	(polyvinyl-acetate, alcohol, acetal, chloride, polyvinylidene chloride, polyvinyl alkyl ethers)
Polyesters (saturated)	(Polystyrene, polyamides (nylons and modifications))
Polyacrylates	(methacrylate and acrylate polymers, cyano-acrylates, acrylamide)

ADHESIVE BONDING GUIDE - SUBSTRATE CROSS REFERENCE

* Denotes Surface Pretreatment may be necessary

The following cross reference identifies recommended Polymer and refers to relevant section for further details.

Where more than one polymer type is recommended, Polymer are in order of preference.

Table A.1 Adhesives bonding guide

- A = Neoprene
- B = SBR
- C = Polyurethane
- D = Nitrile
- E = Natural Rubber
- F = Latex Adhesive
- G = Bitumen Adhesive
- H = PSA
- J = Others

Other Materials												Plastic Materials												Expanded Rubber & Plastic												Other Materials																
NATURAL RUBBER	NEOPRENE	NITRILE	POLYURETHANE	BUTYL	SBR	PVC (Flexible)	ACRYLIC (Rigid)	LAM. PL. SHEETS	POLYSTYRENE	GRR	ABS	POLYURETHANE	NATURAL RUBBER & PLASTIC	NATURAL LATEX FOAM	PU	PVC (Rigid)	PVC (Flexible)	POLYSTYRENE	METALS & ALLOYS	POLYSTYRENE	PVC (Flexible)	PU (Rigid)	NEOPRENE	NAT. LATEX FOAM	NATURAL	POLYURETHANE	ARS	GRR	POLYSTYRENE	LAM. PLASTICS	PVC (Rigid)	SBR	BUTYL	POLYURETHANE	NITRILE	NEOPRENE	NATURAL															
PLASTER (Unpainted)	CONCRETE	CERAMICS (Unpainted)	ASBESTOS	CORK	PAPER & CARDBOARD	Hessian & Carpets	LEATHER	GLASS	FIBREGLASS (Rigid)	FELT	WOOD	PAINTED SURFACES	METALS & ALLOYS	POLYSTYRENE	PVC (Flexible)	PU (Rigid)	NEOPRENE	NAT. LATEX FOAM	NATURAL	POLYURETHANE	ARS	GRR	POLYSTYRENE	LAM. PLASTICS	PVC (Rigid)	SBR	BUTYL	POLYURETHANE	NITRILE	NEOPRENE	NATURAL	FIBREGLASS (Rigid)	PAINTED SURFACES	METALS & ALLOYS	POLYSTYRENE	PVC (Flexible)	PU (Rigid)	NEOPRENE	NAT. LATEX FOAM	NATURAL	POLYURETHANE	ARS	GRR	POLYSTYRENE	LAM. PLASTICS	PVC (Rigid)	SBR	BUTYL	POLYURETHANE	NITRILE	NEOPRENE	NATURAL
PLASTER (Unpainted)	CONCRETE	CERAMICS (Unpainted)	ASBESTOS	CORK	PAPER & CARDBOARD	Hessian & Carpets	LEATHER	GLASS	FIBREGLASS (Rigid)	FELT	WOOD	PAINTED SURFACES	METALS & ALLOYS	POLYSTYRENE	PVC (Flexible)	PU (Rigid)	NEOPRENE	NAT. LATEX FOAM	NATURAL	POLYURETHANE	ARS	GRR	POLYSTYRENE	LAM. PLASTICS	PVC (Rigid)	SBR	BUTYL	POLYURETHANE	NITRILE	NEOPRENE	NATURAL	FIBREGLASS (Rigid)	PAINTED SURFACES	METALS & ALLOYS	POLYSTYRENE	PVC (Flexible)	PU (Rigid)	NEOPRENE	NAT. LATEX FOAM	NATURAL	POLYURETHANE	ARS	GRR	POLYSTYRENE	LAM. PLASTICS	PVC (Rigid)	SBR	BUTYL	POLYURETHANE	NITRILE	NEOPRENE	NATURAL
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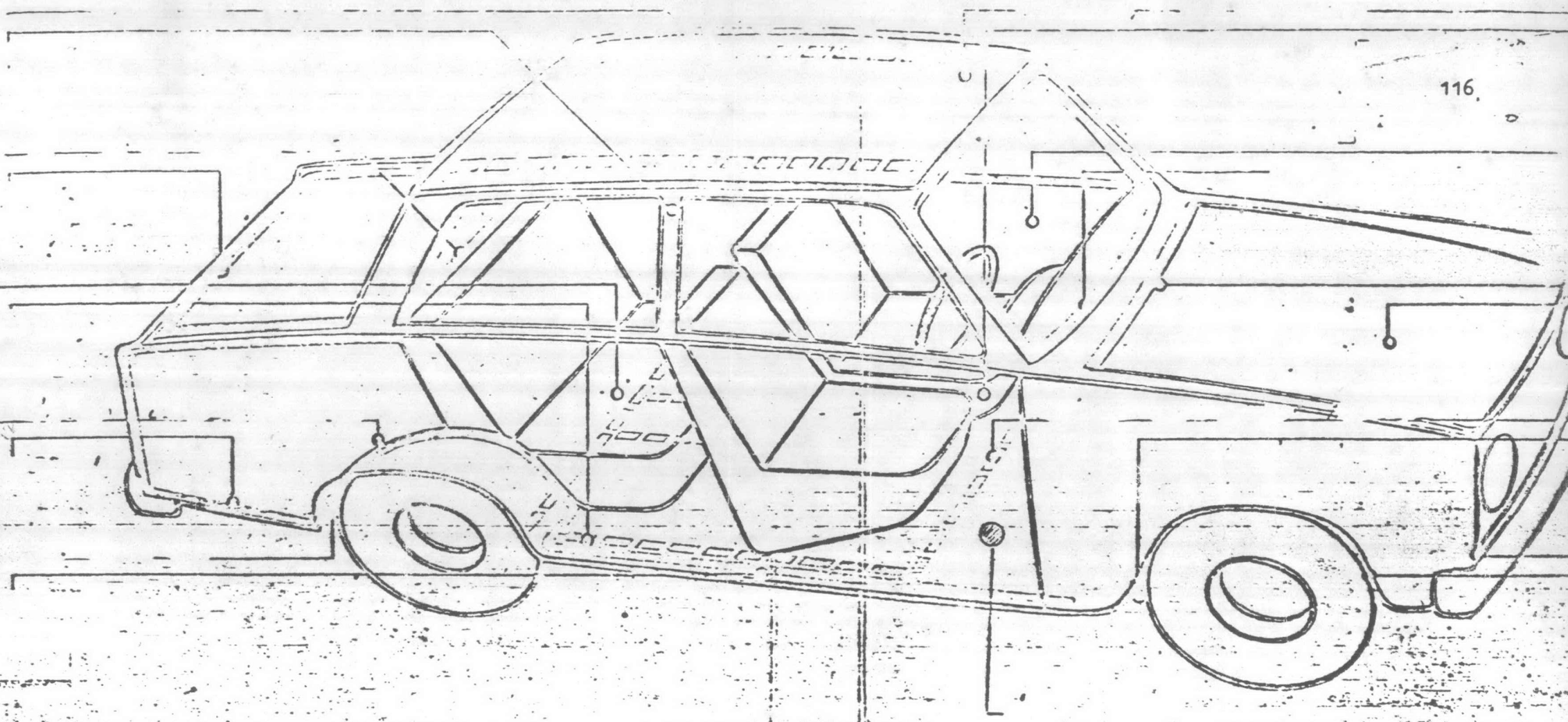
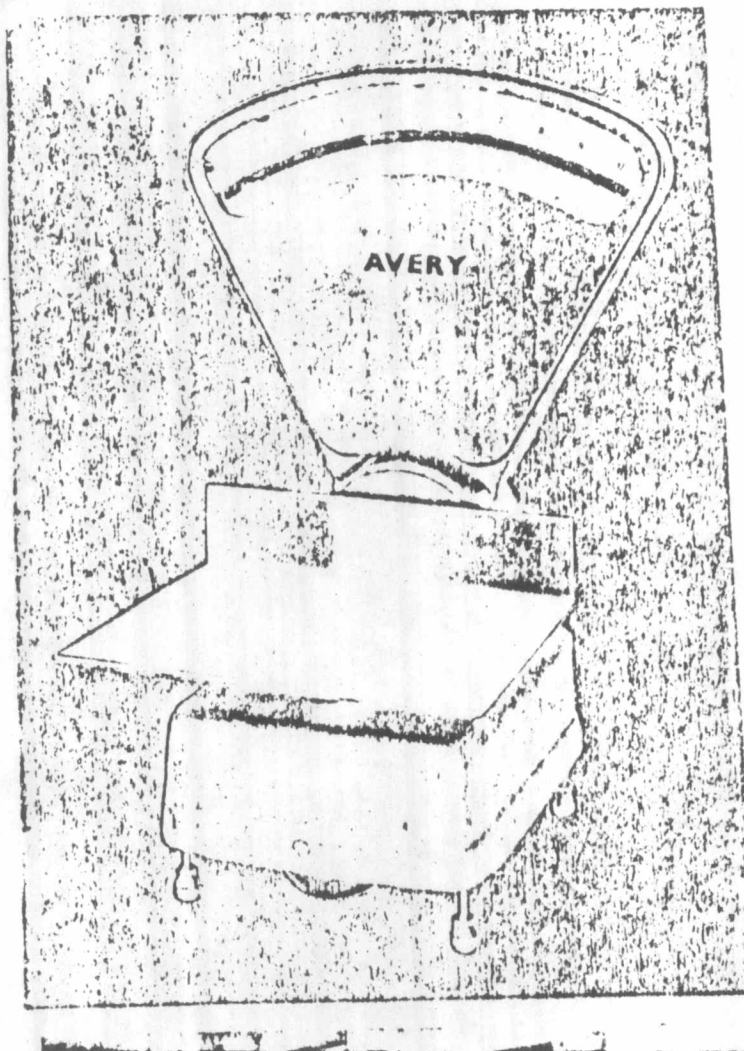
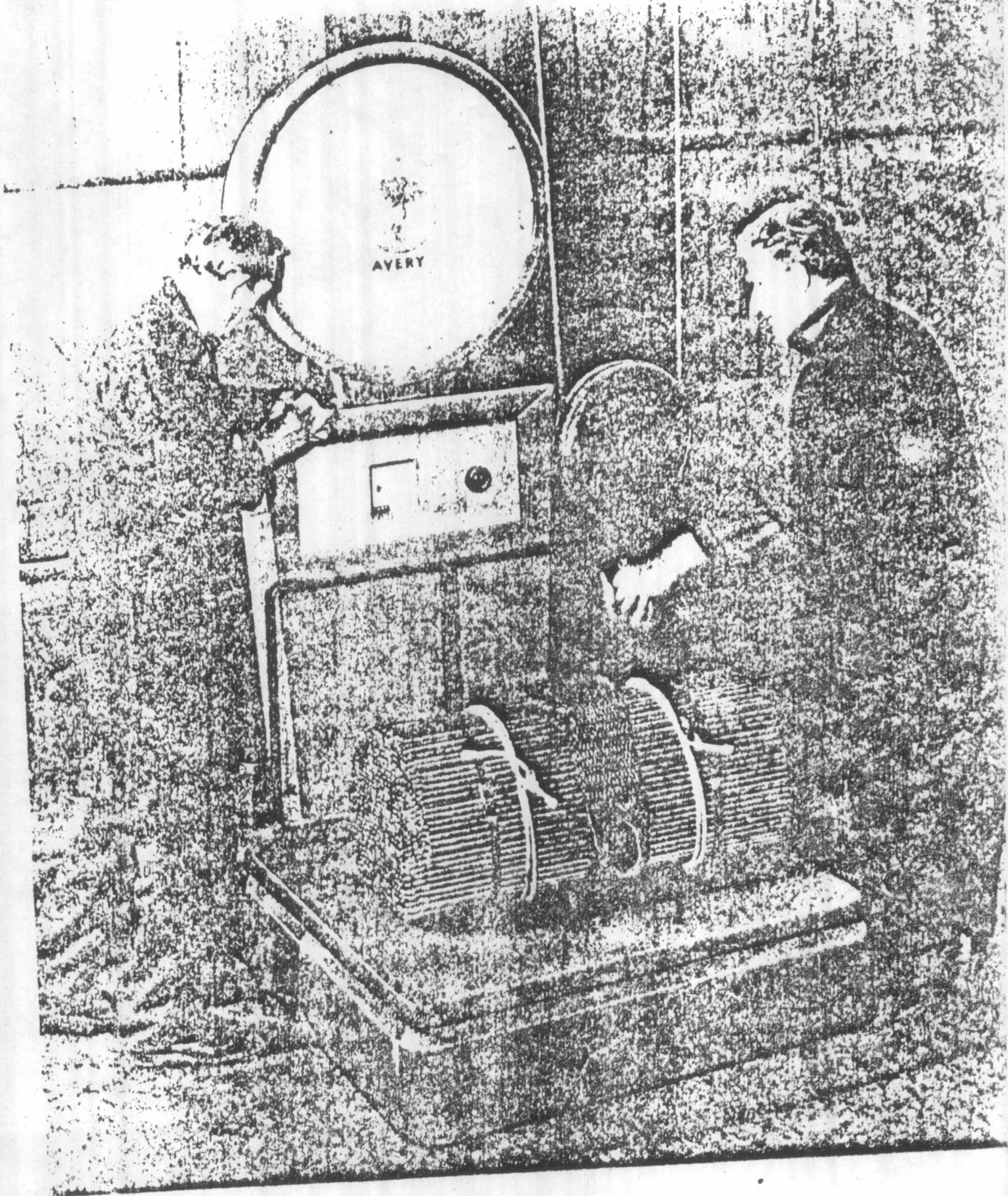


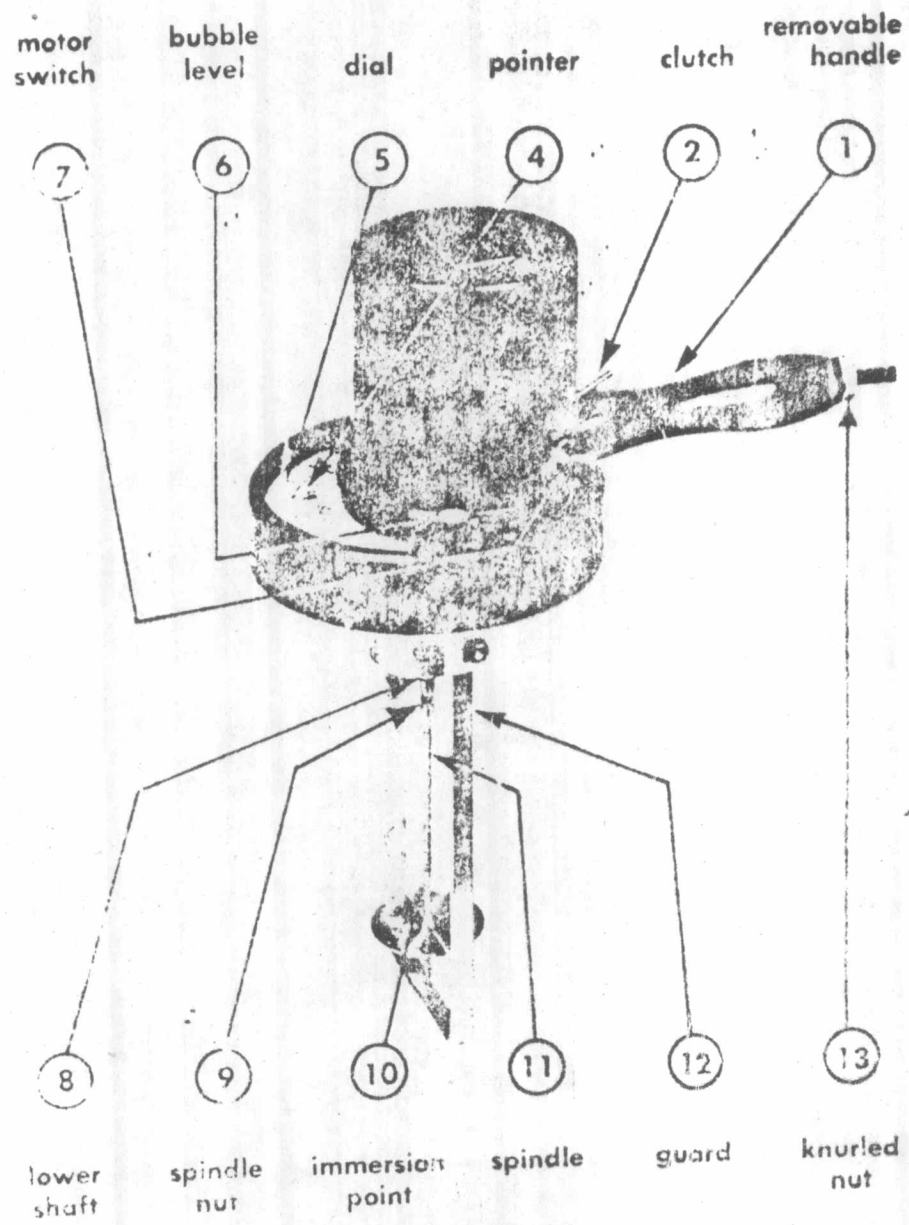
Figure A.1 Adhesives used car



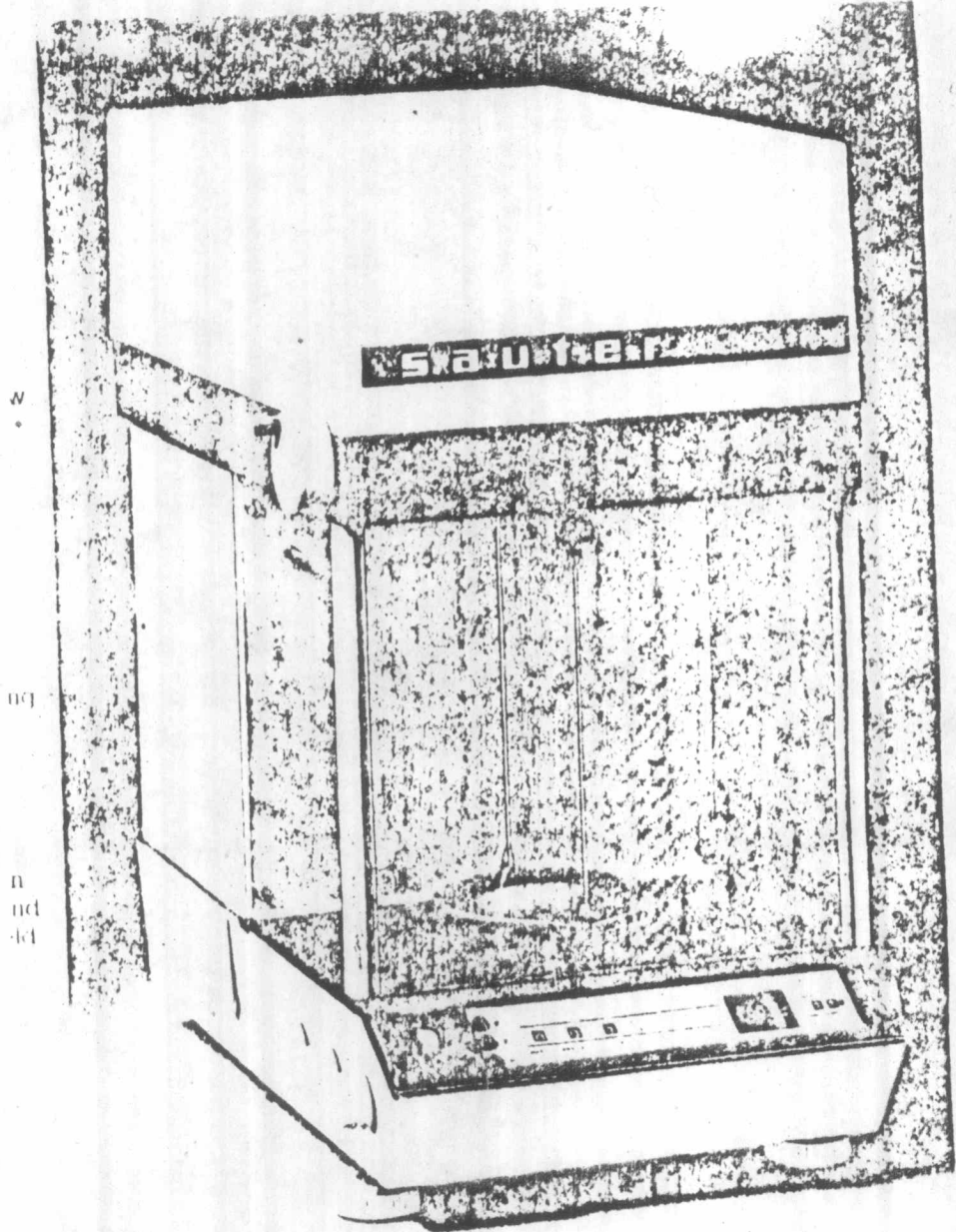
Catalogue B.1 Weigh scale 0-5 Kg



Catalogue B.2 Weigh scale 0 - 250 Kg



Catalogue B.3 Brookfield viscometer



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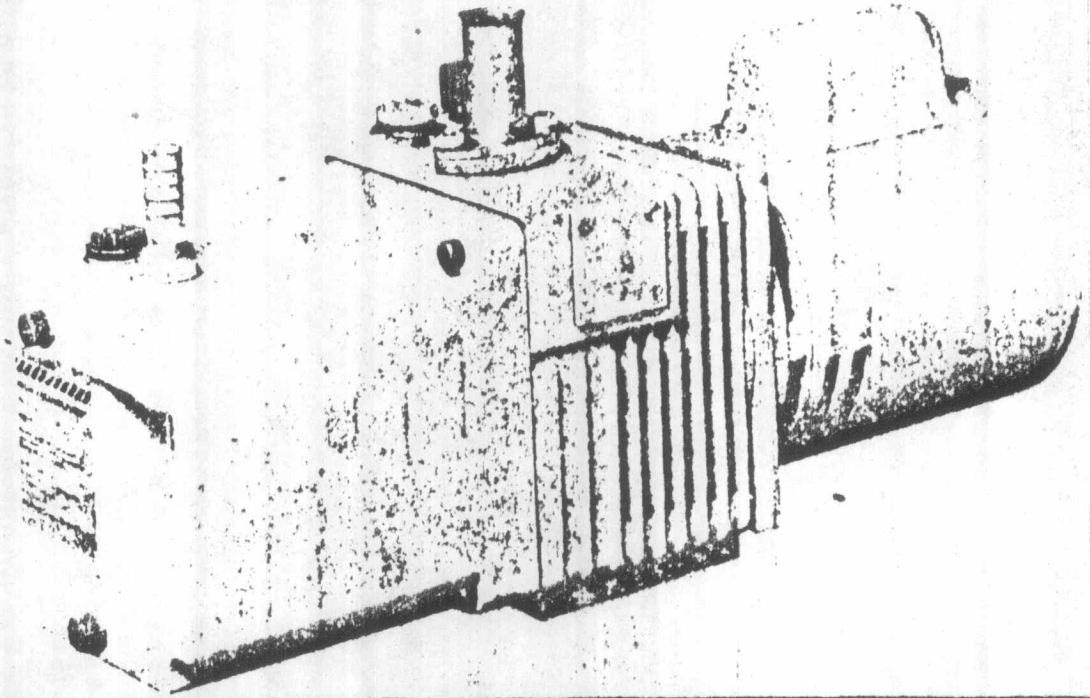
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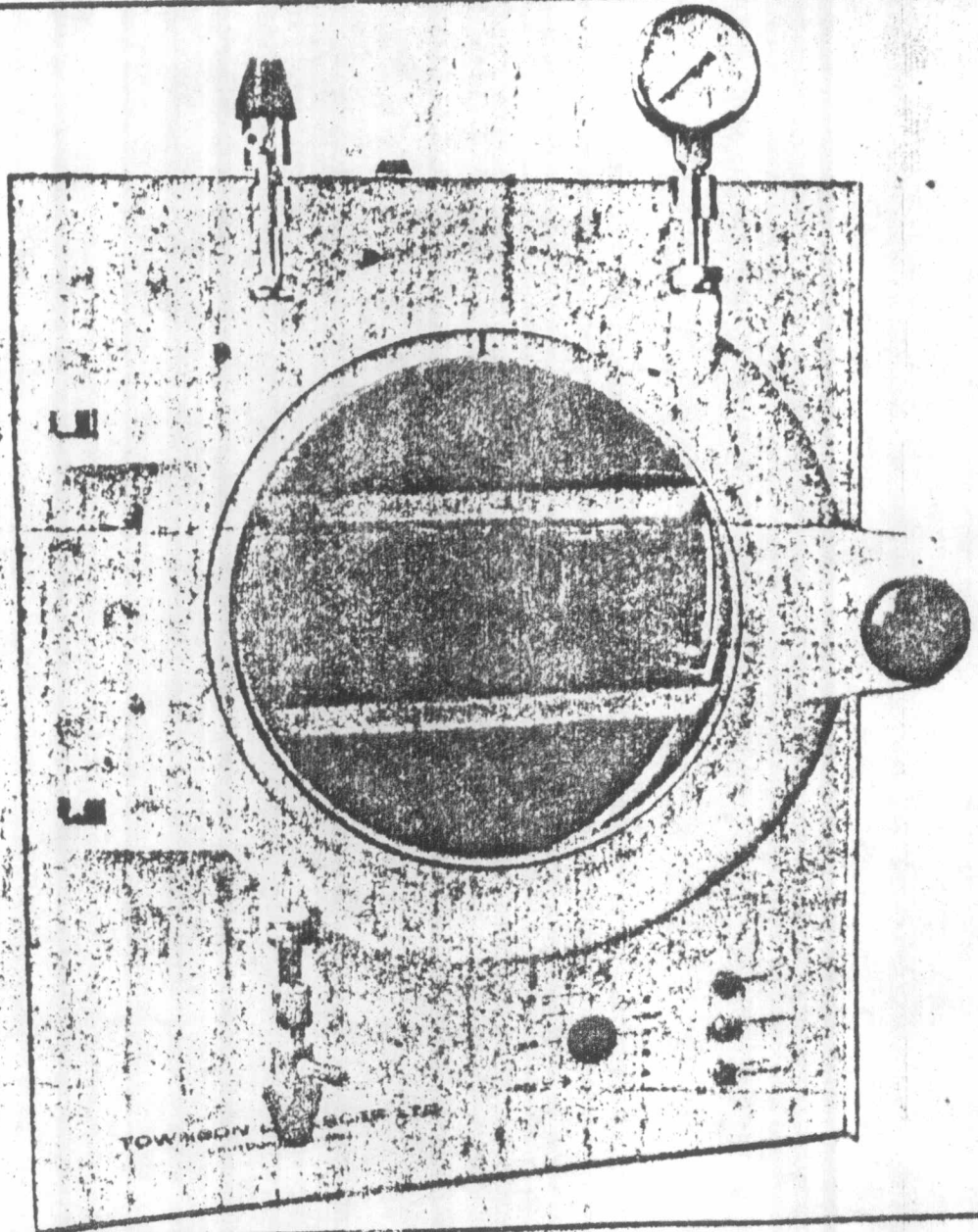
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Catalogue B.4 Electrical balance

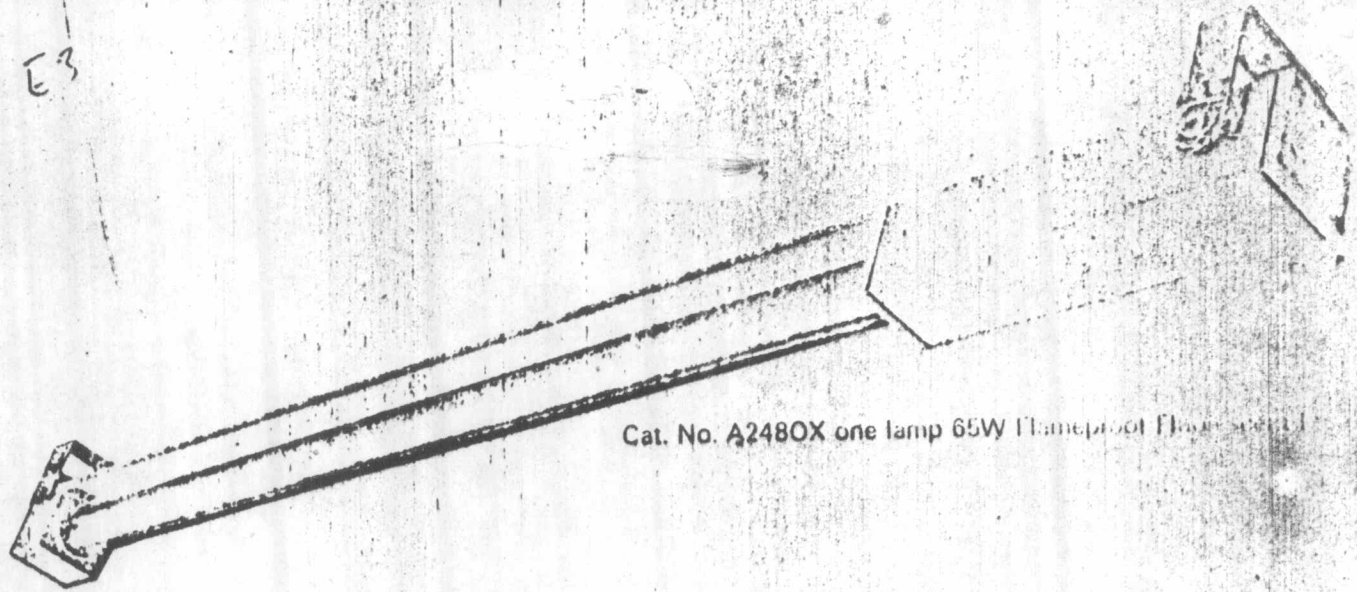
Rotary vacuum pumps



Catalogue B.5 Vacuum pump



- Two sizes available
- Optional over-temperature cut-out
- No limit on maximum vacuum
- Up to 200°C
- Accuracy within 2°C
- Two vacuum taps



Cat. No. A2480X one lamp 65W Flameproof Fluorescent Lamp

Range

- 65W 1500 mm (5ft) 1 Lamp
- 65W 1500 mm (5ft) 2 Lamp

Application

- One and two lamp fittings for 65W 1500mm (5ft) fluorescent lamps. Control gear is standard.
- The fittings are weatherproof and flameproof for use in Division 1 areas as defined in BS Groups II and III: petrol, chemical and other industries.
- They are suitable for use indoors or outdoors and may be mounted horizontally or vertically.

Specification

- Designed and constructed in accordance with BS229, 1957 and BS889, 1965.
- Certified Flameproof by the British Approvals Service for Electrical Equipment in Flammable Atmospheres.
- For use on 240V 50Hz mains supplies in ambients 0°C to 35°C.

Construction and Finish

- The fitting has five main parts: the terminal chamber, the control gear housing, the glazing assembly, the relamping chamber and the suspension arrangement.
- The body, glazing castings and end covers are gravity die-cast in corrosion resistant LM4 aluminium alloy to BS1490:1970.
- Installation is quick and easy for equipment of this kind. The suspension brackets are lifted first, the rest of the fitting is lifted up and hung in position.
- Two lamp fittings comprise two single lamp units interconnected and wired at the factory.
- Re-lamping is carried out from the 'small' end of the fitting, which may be lowered to ground level for operation.

Lamps

Philips Reflectalite lamps are recommended for use with Flameproof Fluorescent fittings. They are available in White 35 and other high efficiency colours.

- Reflectalite lamps give a preferential distribution of light due to the internal reflector which covers approximately two-thirds of the inner surface and directs 90% of the light through the transparent window.

Table B.1 Equipment supplier list

The following suppliers are recommended for the adhesives manufacturing because of prices, services and reliabilities.

Equipment Name	Supplier
1. Weigh scale 0-5 Kg 0-250 Kg	Berli Jucker Co. Sakol Phan Co.
2. Flame Proof Drive	B.grim one Co. Metro Machinery Co.,
3. Brook field Viscometer	Zimmerman Scientific (Thailand) Ltd., Part
4. Vacuum Oven with Pump	Siam Science Co., Ltd. Zimmerman Scientific (Thailand) Ltd., Part.
5. Electrical Balance	Vidhya Som Co. Sakol Phan Co.
6. Peel Strength Test Unit	Satra House: Rockingham Rd. Kettering Nor.
7. Service - Electrical	B. Grim and Co. Philipp Co.

8. Service - Mechanical

Sino Thai Engineering Co.

9. Hose Reel and Fire

Anglo Thai Engineering Co.

Extinguisher

B. Grim and Co.

S. Somboon Phonish Co.

APPENDIX C APPLICATION OF SOLVENTS

Table C.1 Solvents Used With Neoprene

Solvent	SS ^b Solvent Strength, Unmilled W Types	δ Solubility Parameter	HB Hydrogen Bonding Strength	γ Adjusted HB Index	Evaporation Rate ^c	Brookfield Viscosity at 20°C, cps [mPa·s]	Flash Point ^d , °F [°C]	"TLV," ^e ppm [mg/m ³]
Benzene	10	9.2	low	2.6	630	0.65 [0.65]	5 [-15]	125 [80]
Carbon tetrachloride	10	8.6	low	3.4	1280	0.99 [0.99]	none	10 [65]
o-Dichlorobenzene	10	10.0	low	3.1	15	1.27 [1.27]	151 [66]	50 [300]
Nitrobenzene	10	10.0	low	2.9	2	2.17 [2.17]	171 [77] ^d	1 [5]
Toluene	10	8.9	low	3.3	240	0.59 [0.59]	45 [7]	100 [375]
Turpentine	10	8.1	low	3.8	45	1.49 [1.49]	91 [33]	100 [560]
Xylene	10	8.8	low	3.5	63	0.42 [0.42]	81 [27]	100 [435]
Diisobutyl ketone	9	7.8	med	4.8	18	1.00 [1.00]	120 [49]	25 [150]
n-Propyl acetate	9	8.8	med	4.6	276	0.59 [0.59]	55 [13]	200 [840]
Cyclohexane	7	8.2	low	2.2	720	1.06 [1.06]	0 [-18]	300 [1050]
Nitropropane	7	10.7	low	1.9	100	0.93 [0.93]	82 [28]	25 [90]
Methyl ethyl ketone	6 to 8	9.3	med	5.4	572	0.42 [0.42]	30 [-1]	200 [590]
Ethyl acetate	6 to 7	9.1	med	5.2	615	0.44 [0.44]	26 [-3]	400 [1400]
Aniline	5 to 6	11.8	med	4.5	4	4.40 [4.40]	169 [76]	5 [19]
n-Heptane	4	7.4	low	2.2	386	0.42 [0.42]	25 [-4]	500 [2000]
n-Pentane	2	7.0	low	2.2	2860	0.24 [0.24]	-50 [-46]	500 [1500]
Acetone	1 to 2	10.0	med	5.9	1160	0.35 [0.35]	-4 [-20]	1000 [2400]
CAKBITOL solvent ⁽¹⁾	0	9.6	high	9.7	<1	4.30 [4.30]	205 [96]	None established
n-Hexane	0	7.3	low	2.1	1000	0.29 [0.29]	-15 [-26]	500 [1800]
Isopropyl alcohol	0	11.5	high	8.7	300	2.41 [2.41]	55 [13]	400 [980]
Methyl CELLOSOLVE ⁽²⁾	0	10.8	high	7.8	47	1.72 [1.72]	110 [43]	25 [80]

^aSS Rating Scale: 10 = clear solution; 8 = liquid but in 2 phases; 5 = various degrees of swelling; 3 = cloudy solution; 2 = viscous polymer phase; 0 = no swelling

^cRelative to n-Butyl acetate as a rate of 100. Higher numbers mean faster evaporation.

^dMeasured by Tag closed cup method, except for nitrobenzene figures which are by Cleveland open cup method.

^e"TLV" or Threshold Limit Value as adopted by The American Conference of Governmental Industrial Hygienists (1975). These values are subject to change.

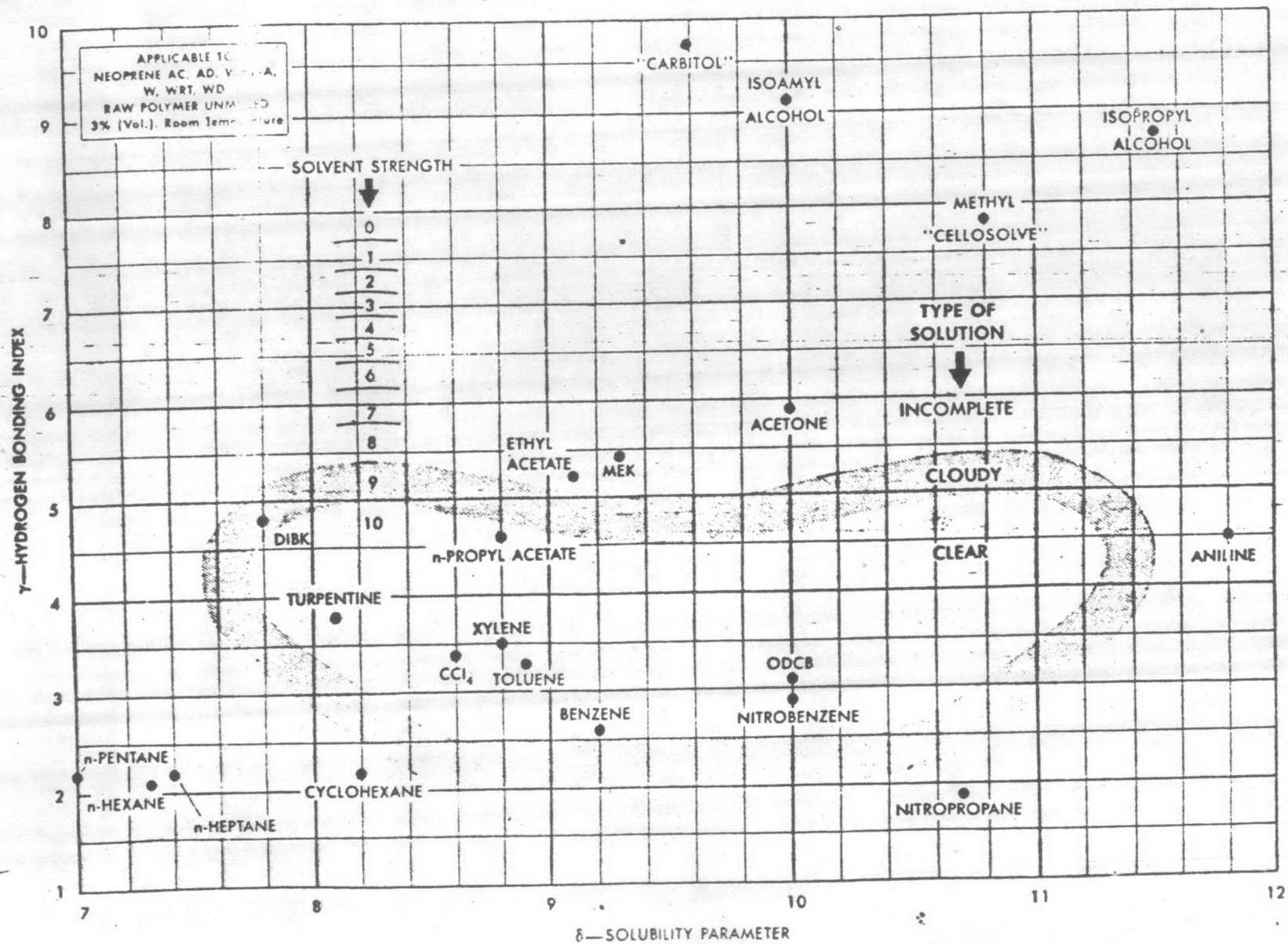
^fACGIH has published notice of intended change to 10 ppm [30 mg/m³] for benzene and to 100 ppm [360 mg/m³] for n-hexane.

^{1,2}Superscript numbers refer to the proprietary materials list, p. 15.

From : " Solvent System For Neoprene "

Du Pont Far East Inc .

Figure C. 1 Solvent Strength Chart

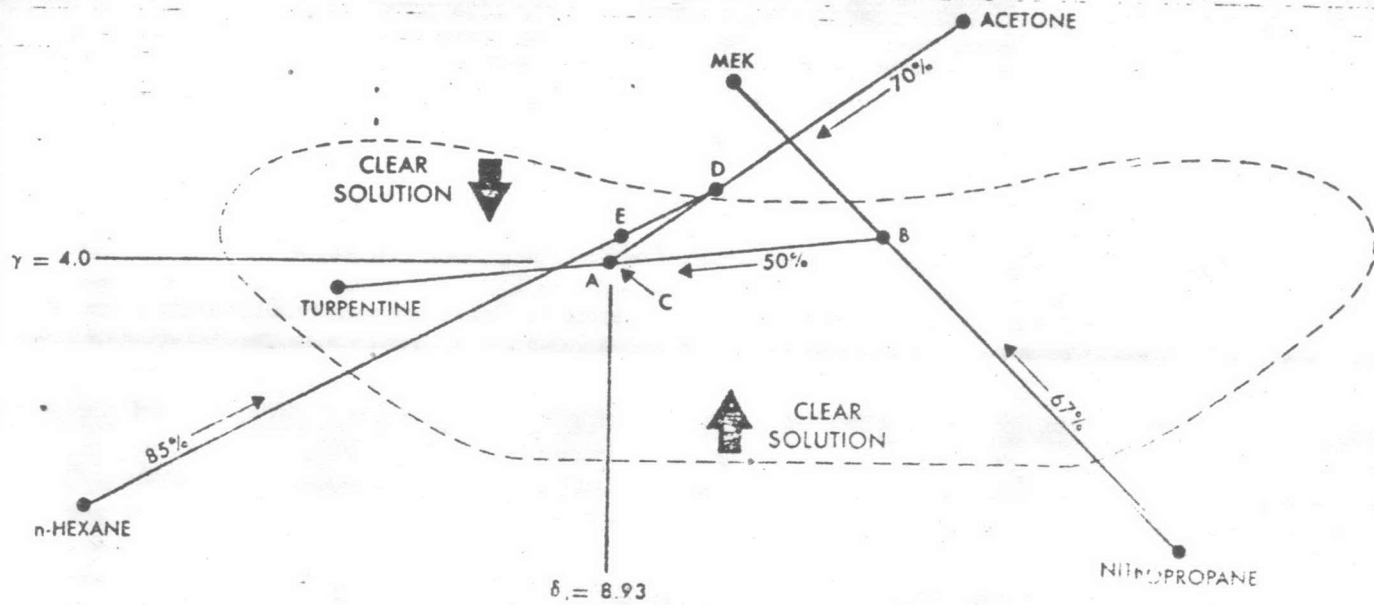


From: "Solvent System For Neoprene"
Du Pont Ray East Inc.

Figure C. 2 Graphical Prediction

	A	B	C	D	E
NITROPROPANE	10	10	10	10	10
MEK	20	20	20	20	20
TURPENTINE	30		30	30	30
ACETONE				25	25
HEXANE					15

POINT A IS FROM CALCULATED δ AND γ VALUES—OTHERS ARE GRAPHICALLY DERIVED



From : " Solvent System For Neoprene "
 Du Pont Ray East Inc .

Fig.

AUTOBIOGRAPHY



The author, Mr. Chutchai Techachaiyanun, was born in 1953 in Bangkok, Thailand. He graduated from Triam Udom Suksa School in 1971 and received his Bachelor Degree in Chemical Engineering from Chulalongkorn University, Thailand, in 1975. Following the graduation, he continued his Master's study at the same university at the same time he worked for Siam Chemicals Co., Ltd. as a project engineer. In 1977 - 1979 he worked for Dunlop Thailand Co., Ltd. as the Head of the Chemical Products Factory. From 1979 to present, he is the Head of the Manufacturing Department in S.C. Johnson & son Co., Ltd. (Johnson Wax).