CNSL-BASED PU FOAMS
GUIDE FORMULATIONS

PIR BOARDSTOCK/PANELS WITH CNSL BASED POLYOLS

GX-9104 as replacement for aromatic polyester polyols:

- Excellent insulation properties
- Excellent fire resistance properties
- Higher compression strength
- Excellent compatibility with pentane

Replacements for aliphatic polyester polyols:

- GX-9006, NX-9001, NX-9007 are suitable
- Excellent fire resistance properties
- Higher compression strength
- Excellent compatibility with pentane

Guide Formulation

Ingredients (Parts by wt)	PU-Ref	PU1-CNSL	PU2-CNSL	PU3-CNSL	PU4-CNSL	PU5-CNSL	PU6-CNSL	PU7-CNSL
240OH (aromatic polyester polyol)	44		44		44			44
190OH (aliphatic polyester polyol)	15	15						
482OH (polyether polyol)	13							
Glycerol		0.4		0.4		0.3	0.47	0.3
GX-9104[1]		43.6		43.6		43.7	44	
GX-9006[1]					15	15		
NX-9001[1]			15	15				
NX-9007[1]							15	15
TCPP	21							
Silicone Surfactant RT0073[2]	3							
DABCO TMR 2[2] (tertiary amine)	1.7	1.65	1.61	1.6	1.7	1.63	1.6	1.6
DABCO K15[2] (catalyst)	1	0.91	0.97	0.84	1	0.93	0.87	0.84
NIAX A-1[3] (amine catalyst)	0.58	0.4	0.52	0.4	0.58	0.51	0.4	0.4
Water	0.77							
Part A Total	100							
Pentane	12.1							
pMDI Index	280							
Mix Time (sec)	7							
String Time (sec)	55	55	46	56	53	54	57	59
Tack Free Time (sec)	92	88	86	86	86	94	93	95
Density (kg/m^3)	34.0	34.5	34.8	35.7	35.8	35.2	34.8	34.5
Compression (kPa)	151	157	160	180	174	167	161	179
UL-94 Vertical UL -94 Horizontal	V0 HBF	V0 HBF	V0 HBF	V0 HBF	V0 HBF	V0 HBF	V0 HBF	V0 HBF

[1] Cardolite [2] Evonik [3] Momentive

Guide Formulation

Ingredients (Parts by wt)	PU-Ref	PU8-CNSL	PU9-CNSL
240OH (aromatic polyester polyol)	44		44
482OH (polyether polyol)		13	
187OH (aromatic polyester polyol)	15	15	
Glycerol		0.4	
GX-9104[1]		43.6	15
TCPP		21	
Silicone Surfactant RT0073[2]		3	
DABCO TMR 2[2] (tertiary amine)	1.7	1.61	1.62
DABCO K15[2] (catalyst)	1	0.89	0.89
NIAX A-1[3] (amine catalyst)	0.58	0.4	0.49
Water		0.77	
Part A Total		100	
Pentane		12.1	
pMDI Index		280	
Mix Time (sec)		7	
String Time (sec)	42	49	45
Tack Free Time (sec)	83	84	83
Density (kg/m3)	34.0	34.0	34.5
Compression (kPa)	170	184	163
UL-94 Vertical/UL -94 Horizontal	V0/HBF	V0/HBF	V0/HBF

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PROCESSING

On lab scale, polyurethane formulations are prepared by properly weighing all the Part B components (polyols, catalysts, silicone, flame retardant additives, water) in a paper cup or in a plastic container. The mixture is then stirred for 600 rpm for 1.5 minutes. pMDI (Part A) is weighed in a different container (typically a paper cup). The correct amount of the blowing agent is then added to Part B, mixed for 10-15 seconds till a homogenous mixture is obtained. Part B's weight is then controlled to check whether any blowing agent loss has occurred during mixing. If so, the necessary amount of blowing agent is added. Part A is then poured onto Part B and the resulting mixture stirred at 2000-3000 rpm (depending on mechanical stirrer type) for the proper amount of time (some seconds, depending on systems reactivity). The resulting mixture is then poured in a mold (wood or metal one) to record the reactivity or left freely rising (e.g. for spray systems). **Please refer to each supplier's material safety data sheet (MSDS) for the most current safety and handling information.**

DISCLAIMER

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