

NCS 992 LLV

NDS104/392

ISOPHTHALIC, INFUSION, POLYESTER RESIN

DESCRIPTION

NCS 992 LLV is a medium reactivity, resilient, isophthalic unsaturated polyester resin developed for high performance applications, using injection and infusion moulding techniques. The outstanding wetting characteristics of NCS 992 LLV with glassfibre make it particularly suitable for use with fabrics.

Fully cured mouldings made with NCS 992 LLV have high mechanical strength and excellent strength retention in wet environments at medium temperatures up to 60°C. Laminates made with this resin are exceptionally consistent in both mechanical and chemical properties, producing a very low scatter in test results.

FEATURES	BENEFITS
Non accelerated	Allows manipulation of gel times
Very low viscosity	Rapid glassfibre wet-out leading to quick cavity filling times.
Specially formulated	High mechanical strength and strength retention in wet environments in temperatures up to 60°C

OTHER VERSIONS

NCS 992	Higher viscosity version of NCS 992 LLV for filament winding, pultrusion, centrifugal moulding or contact moulding techniques.
NCS 992 PA	Pre-accelerated version of NCS 992

The information herein is to assist customers in determining whether our products are suitable for their applications. Our products are intended for sale to industrial and commercial customers. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute any other warranty expressed or implied, including any warranty of merchantability or fitness, nor is protection from any law or patent to be inferred. All patent rights are reserved. The exclusive remedy for all proven claims is replacement of our materials, and in no event shall we be liable for special, incidental, or consequential damages. Our standard conditions of contract will apply to all sales

**TYPICAL
LIQUID
PROPERTIES**

PROPERTY	SPECIFICATION	NCS TEST METHOD
Relative density 25°/25°C	1,115	14
Viscosity @ 25°C, mPa.s	90 - 110	5.2
Acid value, mg KOH/g	17,25	13
Volatile content, %	51 - 53	7A
Geltime @ 25°C, 2 phr* NCS ULTRACURE AC2 and 2 phr* BUTANOX M50, minutes	9 - 13	8
Liquid appearance	Clear	2
Stability in the dark @ 25°C, months	6 minimum	4.1
*phr = parts per hundred resin, by mass		

**CURING
FORMULATION**

NCS 992 LLV can be formulated for use in hot, heat assisted and ambient temperature curing conditions.

COMPONENT	FORMULATION		
	1	2	3
NCS 992 LLV	100	100	100
BZP 50	2		
CUROX M100		1 - 2	
BUTANOX M50			1 - 2
NCS ULTRACURE AC2		0.5 - 2	0.5 - 2

**HOT
CURING
FORMULATION**

The BZP 50 (Benzoyl Peroxide) must be thoroughly dispersed in the resin. The catalysed resin will remain usable at workshop temperature (23°C) for approximately three days. Curing should be carried out at temperatures between 80°C and 140°C. For most applications, 120°C will be found satisfactory. At this temperature, 2 to 4 minutes curing time is usually sufficient, but the exact time is usually dependent on the bulk or thickness of the moulding. The table below shows approximate setting times , 100 parts by mass of NCS 992 LLV containing 2 phr BZP - 50 powder:

SETTING TIME	MINUTES
NCS 992 LLV at 80°C	9
NCS 992 LLV at 100°C	5
NCS 992 LLV at 120°C	3

**COLD
CURING
FORMULATIONS**

When a liquid catalyst such as BUTRANOX M50 is used, it is recommended that the accelerator be added to the resin first, and that small amounts of catalyst be added to the accelerated resin as required. The accelerated resin without catalyst has a long storage life, and this method has many advantages in workshop conditions. For most practical purposes there will be no difference in properties between laminates made with formulations using CUROX M100, and those with formulations using Butanox M50.

The ambient temperature and the amount of accelerator control the geltime of the resin formulation. Alternatively, set levels of both catalyst and accelerator can be used and an inhibitor solution such as NCS N7400 inhibitor solution added to adjust the geltime. The latter approach is particularly suited for injecting or infusing large components where a very long geltime is required.

The tables below indicate the approximate amount of NCS N7400 Inhibitor solution required to achieve different geltimes using NCS Ultracure AC2, together with BUTANOX M50 or CUREX M100.

NCS 992 LLV 100g geltime using 2PHR AC-2 + 2PHR BUTANOX M50

phr N7400	Temperature in °C			
	20	25	30	35
0	15	11	7	5.5
0.1	39	20	15	7
0.2	80	38	30	12.6
0.3	123	65.4	45	22
0.4		105	76	42
0.5		136	103	63
0.6		172	128	88
0.7				116

NCS 992 LLV 100g geltime using 2PHR AC-2 + 2PHR CUROX M100 (LA-3)

phr N7400	Temperature in °C			
	20	25	30	35
0	44	26	15.5	12.5
0.1	60	35	26	19
0.2	126	70	50	25
0.3	240	130	97.4	39
0.4			155	70
0.518				117
0.6				158
0.7				205
0.8				

NCS 992 LLV is a thermosetting resin and should not be processed at temperatures below 15°C. Ideally, the catalyst level should range between 1 and 2 phr.

POST-CURING

Satisfactory laminates for many applications can be made from NCS 992 LLV by curing at ambient temperature (but not less than 15°C). When optimum properties and long-term performance are required however, the laminate should be post-cured.

After release from the mould, laminates should be allowed to mature for 24 hours at workshop temperature (23°C). They should then be post-cured for 3 hours at 80°C, although a longer period at a lower temperature will give almost the same result. The post-cure is most effective if it is carried out immediately after the 24 hour maturing period.

PIGMENTS AND FILLERS

NCS 992 LLV may be pigmented by the addition of up to 5% NCS PIGMENT PASTE, but lower quantities consistent with achieving adequate hiding power are preferred if the physical properties of the laminate are to be maintained.

The addition of fillers to NCS 992 LLV is likely to change the hardening characteristics of the resin and will affect the properties of the laminate. Fillers should be accurately checked for moisture content and effect on geltime and cure rate before use.

FOOD CONTAINERS

After release from the mould, laminates should be allowed to mature for 24 hours at workshop temperature (23°C).

They should then be post-cured for a minimum of 3 hours at 85°C. The post-cure is most effective if it is carried out immediately after the 24 hour maturing period. The mouldings must be thoroughly wet-steam cleaned for at least one hour before being put into use. If wet-steam cleaning is not practical, and the moulding is a vessel or of suitable shape, it should be filled with hot water (60° to 80°C) containing a non-perfumed detergent and left to stand for 2 hours. It should then be emptied and thoroughly washed in several batches of clean hot water.

These precautions are essential to avoid the tainting of foodstuffs.

TYPICAL PHYSICAL PROPERTIES

Typical Properties of Cured NCS 992 LLV (unfilled casting)	
Prepared, postcured for 24 hrs @ 23°C + 2 hrs @ 55°C + 2 hrs @ 80°C and tested in accordance with SABS 713	
Temperature of deflection - under load (1,80 MPa), °C	78
Flexural Strength, MPa	117
Flexural Modulus, MPa	3352
Elongation at break %	4.25
Tensile strength, MPa.	76
Tensile modulus, MPa.	3795
Barcol (GYZJ 934-1) hardness	39

**STORAGE
AND
HANDLING**

To ensure maximum stability and maintain optimum properties, polyester resin should be stored in closed containers, maintained below 25°C and away from heat sources and sunlight. All storage should conform to local fire and building codes. Drum stock should be kept to a reasonable minimum with first-in, first-out stock rotation.

Where bung-in-head containers are stored outside, it is recommended that these be stored in a horizontal position to avoid the ingress of water.

**STANDARD
PACKAGE**

Non-returnable metal drums.
Bulk supplies can be delivered by road tanker.

**MATERIAL SAFETY
DATA SHEET**

A Material Safety Data Sheet is available from your NCS Resins' representative. Make certain that you obtain a copy of this guide to the safe handling of unsaturated polyester resins and resin systems.

**PLEASE READ AND UNDERSTAND THE MATERIAL SAFETY
DATA SHEET BEFORE WORKING WITH THIS PRODUCT**

WARNING: CARE MUST BE TAKEN TO AVOID DIRECT MIXING OF ANY ORGANIC PEROXIDE (CATALYST) WITH METAL SOAPS, AMINE OR ANY OTHER POLYMERISATION ACCELERATOR OR PROMOTER, AS VIOLENT DECOMPOSITION WILL RESULT!

NCS RESINS BRANCHES AT:

JOHANNESBURG / DURBAN / CAPE TOWN / PORT ELIZABETH