NCS RESINS

Technical Information

SABS 713-1999

NCS 991PA

NDS119/116

ISOPHTHALIC CHEMICAL AND WATER RESISTANT POLYESTER RESIN LLOYDS APPROVED

DESCRIPTION

NCS 991PA is a versatile, pre-accelerated, isophthalic, unsaturated polyester resin developed for manufacture of laminates for a wide range of critical applications where tough, high performance water and chemical resistant resin is required.

NCS 991PA is thixotropic and can be applied by brush or spray equipment and may be used in the pultrusion process for the production of profiled sections.

When fully cured, NCS 991PA is resistant to diesel fuel and other mildly corrosive chemicals. The low level of residual styrene of a fully cured laminate makes the resin especially suitable for the manufacture of food containers and other applications which require non-toxic, non-tainting laminates.

NCS 991PA can be used with confidence for the fabrication of chemical plant, tanks, pipes and containers. Contact NCS Resins technical representatives for specific recommendations.

NCS 991PA is suitable for the fabrication of high performance boat hulls. It forms a matched boat building resin system when used with NCS Ultragel 63 Nat PA, and NCS Ultragel 63 P100 PA.

FEATURES	BENEFITS
Preaccelerated	Requires only the addition of suitable catalyst
Thixotropic	Minimal drainage
SABS 713-1999 approved	Meets National Quality Standards
Lloyds approved	Meets International Quality standards
Low residual styrene	Minimal tainting of foodstuffs

TYPICAL LIQUID PROPERTIES

PROPERTY	SPECIFICATION	NCS TEST METHOD
Relative density 25°/25°C	1,10 - 1,12	14
Viscosity @ 25°C, mPa.s	650 - 950	5.3
Acid value, mg KOH/g	12,9 - 18,9	13
Volatile content, %	40 - 44	7A
Geltime @ 25°C, 2 phr* BUTANOX M50, minutes	13 - 23	8
Stability in the dark @ 25°C, months	6 minimum	4.1
*phr = parts per hundred resin, by mass		

CURING CHARACTERISTICS

NCS 991PA needs only the addition of catalyst to start the curing reaction. The resin must be allowed to attain workshop temperature (23°C) before being formulated for use. The correct amount of catalyst is therefore added and thoroughly stirred into the resin shortly before use.

It is particularly important to ensure that the catalyst is thoroughly dispersed in the resin. Poorly dispersed catalyst can cause the resin to cure unevenly, resulting in laminates with under cured areas, which are a potential source of failure.

Curing should not be carried out at temperatures below 15°C. Ideally, the catalyst level should range between 1 and 3 phr*.

POST-CURING

Satisfactory laminates for many applications can be made from NCS 991PA by curing at ambient temperature (but not less than 15°C). When optimum properties and long-term performance are required 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.

For all applications involving foodstuffs, it is essential to post cure the laminate for at least 3h at 85°C and then wet steam clean it for at least one hour before being put into use. For further recommendations contact a NCS Resins technical representative.

PIGMENTS AND FILLERS

NCS 991PA can be pigmented by the addition of up to 5% NCS POLYCHROME pigment paste, but lower quantities consistent with achieving adequate hiding power are preferred if the physical properties of the cured laminate are to be maintained. In applications involving foodstuffs, or where resistance to chemicals or oils is required, tests should be carried out to ensure that the addition of pigment paste does not impair the performance of the laminate.

The addition of fillers to NCS 991PA 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. Pigment pastes added to NCS 991 PA may settle out on prolonged storage, and re-incorporation of the pigments by stirring will be required before the resin is used.

CHEMICAL PERFORMANCE

Since chemical plant operating conditions and environments vary widely and often involve combinations of chemicals, each application must be precisely defined. NCS Resins' technical representative will be pleased to make detailed recommendations for specific applications on request.

TYPICAL PHYSICAL PROPERTIES

Typical Properties of Cured NCS 991PA (unfilled casting)
Prepared, post-cured and tested in accordance with SABS 713-1974, as amended

Temperature of deflection - under load (1,80 MPa), °C	85
Water absorption	
7 days at 23°C, mg	41
a) Increase in mass after 28 days immersion, mg	72
b) Loss in mass after drying, mg	49
Barcol (GYZJ 934-1) hardness	37

Typical Properties of Cured NCS 991PA (unfilled casting)
Prepared, post-cured for 24 hours @ 23°C, 2h @ 55°C and 2 hours @ 80°C and tested in accordance with BS 2782:1980

Specific gravity at 25°C	1,11
Elongation at break * %	5
Tensile strength, MPa	82
Tensile modulus, MPa	3 500
Volumetric shrinkage, %	8,1
* Filtered resin, void-free casting	

Typical Properties of Cured NCS 991 PA Chopped Strand Mat Laminate
Determined in accordance with SABS 141-1992 test methods, on a laminate containing 2 x 450 g/m² layers of chopped strand mat, conforming to the requirements of SABS 419-1972 (1992). The laminate was allowed to cure for 7 days at 23°C (±2°C), and achieve adequate cure as indicated by attainment of Barcol (GYZJ 934-1) hardness before testing.

Tensile strength, MPa:	104
Flexural strength, MPa	252
Barcol (GYZJ 934-1) hardness	55
Glass content, % m/m	31

Typical Properties of Cured NCS 991PA Standard Glass Cloth Laminate
Prepared, post-cured and tested in accordance with SABS 713-1974, as amended

Glass content, % m/m	63,6
Flexural strength:	
a) At 23°C	544
b) At temperature of deflection	402

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