



## Noryl\* Resin WCD851

**Asia Pacific: COMMERCIAL** 

Flexible, strong flame-retardant, halogen-free extrusion grade intended for evaluation in applications such as wire insulation and cable jacket. Flame retardant performance capable of meeting UL VW-1 requirement. 80C temperature rating as defined by UL 1581. 85 Shore A hardness. Processing typically conducted on standard extrusion equipment. UL 1581 tests conducted on 2.0 mm wire with 0.12 mm x 20 stranded copper conductor.

## **Property**

Tensile Stress, brk, Type I, 50 mm/min         177         MPa         ASTM D 638           Tensile Strain, brk, Type I, 50 mm/min         147         %         ASTM D 638           Flexural Modulus, 12.5 mm/min, 100 mm span         150         MPa         ASTM D 790           Hardness, Shore A, 30S reading         85         -         ASTM D 792           Tensile Stress, break, 50 mm/min         16         MPa         ISO 527           Flexural Modulus, 12.5 mm/min         140         MPa         ISO 507           Flexural Modulus, 12.5 mm/min         140         MPa         ISO 178           Immodulus, 12.5 mm/min         440         MPa         ISO 178           Immodulus, 12.5 mm/min         440         MPa         ISO 178           Immodulus, 12.5 mm/min         420         42         42         42         42         42         435 M D 160         42         42         42         42         42         435 M D 123         435 M D 123         435 M D 123         435 M D 123	TYPICAL PROPERTIES (1)			
Tensile Strain, brk, Type I, 50 mm/min         147         %         ASTM D 638           Flexural Modulus, 12.5 mm/min, 100 mm span         150         MPa         ASTM D 790           Hardness, Shore A, 30S reading         85         - ASTM D 2240           Tensile Stress, break, 50 mm/min         16         MPa         ISO 527           Tensile Strain, break, 50 mm/min         122         %         ISO 527           Tensural Modulus, 12.5 mm/min         140         MPa         ISO 787           IMPACT         Value         Unit         Standard           Brittleness Temperature         <-40         °C         ASTM D 746           PHYSICAL         Value         Unit         Standard           Melt Flow Rate, 250°C/5.0 kgf         9.5         g*10 min         ASTM D 746           Melt Flow Rate, 250°C/5.0 kgf         9.5         g*10 min         ASTM D 740           Volume Resistivity         2.5E+15 cm         Ohm-om         ASTM D 123           ELECTRICAL         Value         Unit         Standard           Volume Resistivity, 1 MHz         2.5E+15 cm         Ohm-om         ASTM D 150           Dissipation Factor, 1 MHz         0.003         - ASTM D 150           Dissipation Factor, 1 MHz         0.003	MECHANICAL	Value	Unit	Standard
Flexural Modulus, 12.5 mm/min, 100 mm span	Tensile Stress, brk, Type I, 50 mm/min	17	MPa	ASTM D 638
Hardness, Shore A, 30S reading	Tensile Strain, brk, Type I, 50 mm/min	147	%	ASTM D 638
Tensile Stresk, 50 mm/min         16         MPa         ISO 527           Tensile Strain, break, 50 mm/min         122         %         ISO 527           Tensile Strain, break, 50 mm/min         120         %         ISO 178           IMPACT         Value         Unit         Standard           Brittleness Temperature         <-40	Flexural Modulus, 12.5 mm/min, 100 mm span	150	MPa	ASTM D 790
Tensile Strain, break, 50 mm/min         122         %         ISO 527           Flexural Modulus, 12.5 mm/min         140         MPa         ISO 178           IMPACT         Value         Unit         Standard           Brittleness Temperature         <-40         °C         ASTM D 746           PHYSICAL         Value         Unit         Standard           Specific Gravity         1.09         -         ASTM D 792           Melt Flow Rate, 250°C/5.0 kgf         9.5         g/10 min         ASTM D 792           Melt Flow Rate, 250°C/5.0 kgf         9.5         g/10 min         ASTM D 1238           ELECTRICAL         Value         Unit         Standard           Volume Resistivity         2.5E+15         Ohmonomic         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Diselectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         0.003         -         ASTM D 150           ELAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max <td>Hardness, Shore A, 30S reading</td> <td>85</td> <td>-</td> <td>ASTM D 2240</td>	Hardness, Shore A, 30S reading	85	-	ASTM D 2240
Flexural Modulus, 12.5 mm/min	Tensile Stress, break, 50 mm/min	16	MPa	ISO 527
IMPACT         Value         Unit         Standard           Brittleness Temperature         <-40	Tensile Strain, break, 50 mm/min	122	%	ISO 527
Brittleness Temperature         <-40         °C         ASTM D 746           PHYSICAL         Value         Unit         Standard           Specific Gravity         1.09         -         ASTM D 792           Melt Flow Rate, 250°C/5.0 kgf         9.5         g/10 min         ASTM D 1238           ELECTRICAL         Value         Unit         Standard           Volume Resistivity         2.5E+15         Ohm- color         ASTM D 150           Relative Permittivity, 1 MHz         2.7         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Comparative Tracking Index         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60112           ELAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Ignitability Temperature	Flexural Modulus, 12.5 mm/min	140	MPa	ISO 178
PHYSICAL         Value         Unit         Standard           Specific Gravity         1.09         -         ASTM D 792           Melt Flow Rate, 250°C/5.0 kgf         9.5         9/10 min         ASTM D 1238           ELECTRICAL         Value         Unit         Standard           Volume Resistivity         2.5E+15         0hm cm         ASTM D 257           Relative Permittivity, 1 MHz         2.7         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Diselectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60212           FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 60695-2-12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 60695-2-13           Oxygen Index (LOI)         26         %         ISO 4589 <td< td=""><td>IMPACT</td><td>Value</td><td>Unit</td><td>Standard</td></td<>	IMPACT	Value	Unit	Standard
Specific Gravity         1.09         -         ASTM D 792           Melt Flow Rate, 250°C/5.0 kgf         9.5         g/10 min         ASTM D 1238           ELECTRICAL         Value         Unit         Standard           Volume Resistivity         2.5E+15 cm         Ohm-cm         ASTM D 257           Relative Permittivity, 1 MHz         2.7         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Dislectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60243-1           Comparative Tracking Index         Value         Unit         Standard           ELAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         76         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         80         °C         IEC 60695-2-12         12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 60695-2-13         13           Oxygen Index (LOI)         26	Brittleness Temperature	<-40	°C	ASTM D 746
Melt Flow Rate, 250°C/5.0 kgf         9.5         g/10 min         ASTM D 1238           ELECTRICAL         Value         Unit         Standard           Volume Resistivity         2.5E+15         Ohm cm         ASTM D 257           Relative Permittivity, 1 MHz         2.7         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Dielectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60112           FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 60695-2-12         12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 60695-2-13         13           Oxygen Index (LOI)         26         %         ISO 4589           WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper         Value         Unit         Standard           Tensile streng	PHYSICAL	Value	Unit	Standard
STM D 1288   STM	Specific Gravity	1.09	-	ASTM D 792
Volume Resistivity         2.5E+15         Ohm-cm cm         ASTM D 257           Relative Permittivity, 1 MHz         2.7         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Dielectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60112           FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 60695-2-12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 60695-2-13           Oxygen Index (LOI)         26         %         ISO 4589           WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper         Value         Unit         Standard           Tensile strength @ break         19         MPa         UL 1581           Tensile elongation @ break         200         %         UL 1581           Tensile elongation @ break after 7days @113°C	Melt Flow Rate, 250°C/5.0 kgf	9.5	_	ASTM D 1238
Volume Resistivity         2.5E+15 cm         ASTM D 257 cm           Relative Permittivity, 1 MHz         2.7         -         ASTM D 150           Dissipation Factor, 1 MHz         0.003         -         ASTM D 150           Dielectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60112           FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 600695-2-12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 600695-2-13           Oxygen Index (LOI)         26         %         ISO 4589           WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper         Value         Unit         Standard           Tensile strength @ break         19         MPa         UL 1581           Tensile elongation @ break         200         %         UL 1581           Tensile elongation @ break after 7days @113°C         21	ELECTRICAL	Value	Unit	Standard
Dissipation Factor, 1 MHz       0.003       - ASTM D 150         Dielectric strength in oil, 2.0mm       26 kV/mm       IEC 60243-1         Comparative Tracking Index       600 V IEC 60112         FLAME CHARACTERISTICS       Value Unit       Standard         Smoke Density on 0.5mm plaque, Non-flame, Ds, max       76 - ASTM E 662         Smoke Density on 0.5mm plaque, Flame, Ds, max       94 - ASTM E 662         Glow Wire Flammability Index 960°C, passes at       3 mm       IEC 60695-2-12         Glow Wire Ignitability Temperature, 3.0 mm       800 °C       IEC 60695-2-13         Oxygen Index (LOI)       26 % ISO 4589         WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper       Value Unit       Standard         Tensile strength @ break       19 MPa UL 1581       UL 1581         Tensile elongation @ break       200 % UL 1581       UL 1581         Tensile strength @ break after 7days @113°C       21 MPa UL 1581       UL 1581         UL temperature rating       80 °C UL 1581	Volume Resistivity	2.5E+15		ASTM D 257
Dielectric strength in oil, 2.0mm         26         kV/mm         IEC 60243-1           Comparative Tracking Index         600         V         IEC 60112           FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 60695-2-12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 60695-2-13           Oxygen Index (LOI)         26         %         ISO 4589           WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper         Value         Unit         Standard           Tensile strength @ break         19         MPa         UL 1581           Tensile elongation @ break         200         %         UL 1581           Tensile elongation @ break after 7days @113°C         21         MPa         UL 1581           UL temperature rating         80         °C         UL 1581	Relative Permittivity, 1 MHz	2.7	-	ASTM D 150
Comparative Tracking Index         600         V         IEC 60112           FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 60695-2-12           12         12         12         12           Glow Wire Ignitability Temperature, 3.0 mm         26         %         ISO 4589           WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper         Value         Unit         Standard           Tensile strength @ break         19         MPa         UL 1581           Tensile elongation @ break         200         %         UL 1581           Tensile elongation @ break after 7days @113°C         21         MPa         UL 1581           UL temperature rating         80         °C         UL 1581	Dissipation Factor, 1 MHz	0.003	-	ASTM D 150
FLAME CHARACTERISTICS         Value         Unit         Standard           Smoke Density on 0.5mm plaque, Non-flame, Ds, max         76         -         ASTM E 662           Smoke Density on 0.5mm plaque, Flame, Ds, max         94         -         ASTM E 662           Glow Wire Flammability Index 960°C, passes at         3         mm         IEC 60695-2-12           Glow Wire Ignitability Temperature, 3.0 mm         800         °C         IEC 60695-2-13           Oxygen Index (LOI)         26         %         ISO 4589           WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper         Value         Unit         Standard           Tensile strength @ break         19         MPa         UL 1581           Tensile elongation @ break         200         %         UL 1581           Tensile elongation @ break after 7days @113°C         21         MPa         UL 1581           UL temperature rating         80         °C         UL 1581	Dielectric strength in oil, 2.0mm	26	kV/mm	IEC 60243-1
Smoke Density on 0.5mm plaque, Non-flame, Ds, max       76       -       ASTM E 662         Smoke Density on 0.5mm plaque, Flame, Ds, max       94       -       ASTM E 662         Glow Wire Flammability Index 960°C, passes at       3       mm       IEC 60695-2-12         Glow Wire Ignitability Temperature, 3.0 mm       800       °C       IEC 60695-2-13         Oxygen Index (LOI)       26       %       ISO 4589         WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper       Value       Unit       Standard         Tensile strength @ break       19       MPa       UL 1581         Tensile elongation @ break       200       %       UL 1581         Tensile strength @ break after 7days @113°C       21       MPa       UL 1581         Tensile elongation @ break after 7days @113°C       165       %       UL 1581         UL temperature rating       80       °C       UL 1581	Comparative Tracking Index	600	V	IEC 60112
Smoke Density on 0.5mm plaque, Flame, Ds, max       94       -       ASTM E 662         Glow Wire Flammability Index 960°C, passes at       3       mm       IEC 60695-2-12         Glow Wire Ignitability Temperature, 3.0 mm       800       °C       IEC 60695-2-13         Oxygen Index (LOI)       26       %       ISO 4589         WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper       Value       Unit       Standard         Tensile strength @ break       19       MPa       UL 1581         Tensile elongation @ break       200       %       UL 1581         Tensile strength @ break after 7days @113°C       21       MPa       UL 1581         Tensile elongation @ break after 7days @113°C       165       %       UL 1581         UL temperature rating       80       °C       UL 1581	FLAME CHARACTERISTICS	Value	Unit	Standard
Slow Wire Flammability Index 960°C, passes at   3 mm   IEC 60695-2-12   12   12   12   12   12   12   12	Smoke Density on 0.5mm plaque, Non-flame, Ds, max	76	-	ASTM E 662
Colow Wire Flammability Index 960°C, passes at   12   12   12   12   13   12   15   15   15   15   15   15   15	Smoke Density on 0.5mm plaque, Flame, Ds, max	94	-	ASTM E 662
Glow Wire Ignitability Temperature, 3.0 mm  Oxygen Index (LOI)  WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper  Tensile strength @ break  Tensile elongation @ break  Tensile strength @ break after 7days @113°C  Tensile elongation @ break after 7days @113°C  165 % UL 1581  UL temperature rating	Glow Wire Flammability Index 960°C, passes at	3	mm	
WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded copper  Tensile strength @ break Tensile elongation @ break Tensile strength @ break after 7days @113°C Tensile elongation @ break after 7days @113°C  UL 1581  UL temperature rating	Glow Wire Ignitability Temperature, 3.0 mm	800	°C	
Copper         Value         Unit         Standard           Tensile strength @ break         19         MPa         UL 1581           Tensile elongation @ break         200         %         UL 1581           Tensile strength @ break after 7days @113°C         21         MPa         UL 1581           Tensile elongation @ break after 7days @113°C         165         %         UL 1581           UL temperature rating         80         °C         UL 1581	Oxygen Index (LOI)	26	%	ISO 4589
Tensile strength @ break Tensile elongation @ break Tensile strength @ break after 7days @113°C Tensile elongation @ break after 7days @113°C Tensile elongation @ break after 7days @113°C Tensile elongation @ break after 7days @113°C UL temperature rating  ### April 19	WIRE AND CABLE - UL 1581 tested on 2.0mm wire with 0.12mmx20 stranded	Value	Unit	Standard
Tensile elongation @ break  Tensile strength @ break after 7days @113°C  Tensile elongation @ break after 7days @113°C  Tensile elongation @ break after 7days @113°C  UL 1581  UL 1581	copper	Value	O.I.I.	
Tensile strength @ break after 7days @113°C  Tensile elongation @ break after 7days @113°C  UL temperature rating  21 MPa UL 1581  UL 1581  UL 1581	·	_		
Tensile elongation @ break after 7days @113°C	Tensile elongation @ break			
UL temperature rating 80 °C UL 1581	·			
	·			
Heat Deformation at 100°C/250g 17 % UL 1581	_ · _ ·		-	
	Heat Deformation at 100°C/250g	17	%	UL 1581

Source GMD, last updated:02/26/2008

## **Processing**

Parameter		
Wire Coating Extrusion	Value	Unit
Drying Temperature	75 - 85	°C
Drying Time	5 - 7	hrs
Drying Time (Cumulative)	12	hrs
Maximum Moisture Content	0.02	%
Extruder Length/Diameter Ratio (L/D)	22:1 to 26:1	-
Screw Speed	15 - 85	rpm
Feed Zone Temperature	180 - 230	°C
Middle Zone Temperatures	230 - 260	°C
Head Zone Temperature	230 - 260	°C
Neck Temperature	230 - 260	°C
Cross-head Temperature	230 - 260	°C
Die Temperature	230 - 260	°C
Melt Temperature	230 - 260	°C
Conductor Pre-heat Temperature	25 - 120	°C
Screen Pack	150 - 100	-
Cooling Water Air Gap	100 - 200	mm
Water Bath Temperature	15 - 60	°C

Source GMD, last updated:02/26/2008

NOTE: Recommended Drying Parameters are based on usage of Dehumidify Drying / Drying Oven.

THESE PROPERTY VALUES ARE NOT INTENDED FOR SPECIFICATION PURPOSES.

PLEASE CHECK WITH YOUR (LOCAL SALES OFFICE) FOR AVAILABILITY IN YOUR REGION

- (1) Typical values only. Variations within normal tolerances are possible for various colors. All values are measured after at least 48 hours storage at 23°C/50% relative humidity. All properties, except the melt volume and melt flow rates, are measured on injection molded samples. All samples tested under ISO test standards are prepared according to ISO 294.
- (2) Only typical data for selection purposes. Not to be used for part or tool design.
- (3) This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.
- (4) Internal measurements according to UL standards.

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