



Type XHHW-2 or RHH/RHW-2/USE-2 GenFree® II LSZH XLPO Single Conductor

Specifications 5075, 5125 & 5275

GenFree II LSZH XLPO Low-Voltage Power

Single and Dual Layer Cross-linked Polyolefin Single Conductor

Rated for 600 Volts or 2000 Volts (AC or DC)

For Use in all Closed Environments, Commercial / Utility / Industrial Applications, Free Air or Direct Burial

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I. SCOPE

This specification covers single conductor wire and cable rated at 600 volts or 2000 volts, AC or DC, insulated with General Cable's Low-Smoke, Zero-Halogen insulation, a thermosetting irradiation cross-linked polyolefin which is flame-retardant, moisture- and oil-resistant, and mechanically tough.

II. APPLICATION DOCUMENTS

The wire and cable manufactured under this specification shall be tested and inspected in accordance with the latest issues of the following standards, as applicable or as modified herein:

ASTM B33	Standard for Tin-Coated Soft or Annealed Copper Wire (5075 & 5275)
ASTM B3	Standard for Soft or Annealed Copper Wire (5125)
ASTM B8	Standard for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
UL 854	Standard for Service-Entrance Cables (5075 & 5275)
IEEE Std 1202	Standard for Flame-Propagation Testing of Wire and Cable
ICEA S-95-658	ICEA/NEMA Standard for Non-shielded Power Cables Rated 2000 Volt or Less for Distribution of Electrical Energy (NEMA WC 70)
ICEA T-33-655	ICEA/NEMA Standard for Low-Smoke, Zero-Halogen (LSZH) Polymeric Cable Jackets
UL 44	Standard for Thermoset-Insulated Wires and Cables
UL 1685	Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables



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III. CONDUCTOR

5075 & 5275 Conductors shall be of compressed tinned copper per ASTM B33 and shall conform to requirements as listed in ASTM B8 for Class B standing.

5125 Conductors shall be of stranded annealed bare copper per ASTM B3 and shall conform to requirements as listed in ASTM B8 for Class B stranding.

IV. SEPARATOR

A suitable separator may be used if deemed necessary by the manufacturer.

V. INSULATION

5075 The insulation shall be Composite, Low-Smoke, Zero-Halogen, Cross-linked Polyolefin (LSZH XLPO) colored for contrast with black Low-Smoke, Zero-Halogen, Cross linked Polyolefin (LSZH XLPO) in accordance with the requirements of UL 44 Type RHH/RHW-2 and UL 854 Type USE-2.

5125 The insulation shall be Low-Smoke, Zero-Halogen, Flame-Retardant Cross-linked Polyolefin (LSZH XLPO) in accordance with the requirements of UL 44 Type XHHW-2, black. Colors available upon request.

5275 The insulation shall be Low-Smoke, Zero-Halogen, Cross-linked Polyolefin (LSZH XLPO) in accordance with the requirements of UL 44 Type RHH/RHW-2 and UL 854 Type USE-2.

All three product lines share both the common critical characteristics and listings, but in a fully functional LSZH product:

- Type XHHW-2 Spec 5125
- Single layer tri-rated Type RHH/RHW-2/USE-2 Spec 5275
- Dual layer tri-rated Type RHH/RHW-2/USE-2 Spec 5075

GenFree II products meet or exceed the following industry standards and testing criteria:

A. Physical Properties:

Passes the current overload crush test as required per UL 854 for approval as USE-2, allowing for approval for use in underground service entrance applications as approved by the NEC.



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GenFree II Physical Properties Test Requirements:

Property or Test	UL 44	Requirements
Unaged	Table 11	
Tensile Strength (psi)		1500 min
Elongation (%)		150 min
Aged	Table 11	
Tensile Retention (% of original)		70
Elongation Retention (% of original)		70

Property or Test	UL 854 USE-2	Requirements
Physical Properties		
Impact Resistance Test 5 lbs., 1 ft. drop	Para. 23	8 of 10 no current leak
Crushing Resistance Test	Para. 24	
Test without current		1000 lbf min
Test with rated current		800 lbf min
Test with overload current		600 lbf min

B. Electrical properties:

Meets or exceeds all requirements of UL 44 Type XHHW-2, RHH, RHW-2, UL 854 Type SE-2, and ICEA S-95-658/NEMA WC70 for operation at 90°C for both wet and dry environments.

Property or Test	UL 44	Requirements
Physical Properties		
Insulation Resistance in Water @ 90°C	Para. 5.4	
Insulation Resistance		0.180 M /kft min
Rate of Decrease >10 M /kft		4% decrease max
Capacitance and Relative Permittivity @ 90°C		
Relative Permittivity		6.0 max
Increase in Capacitance	Para. 5.6	
1-14 Day		10.0% max
7-14 Day		4.0% max



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C. Flame Resistance:

Single Wire Test:

All three product types meet the requirements of the UL 44 VW-1 flame test, allowing these cables to be listed as VW-1 compliant.

Large Scale Tray Flame Tests:

All three product types meet the requirements of both the IEEE 1202 and UL1685 flame test, allowing all products 1/0 AWG and larger to be UL listed for “CT USE” for installation in cable trays per the NEC.

GenFree II Flame Test Requirements:

Property or Test	Vertical Tray and VW-1 Test	Requirements
Physical Properties		
Test 1 – UL 1685	Max cable damage height	96” max
Test 2 – IEEE 1202		59” max
Test 3 – UL 44 VW-1	Flame propagation Flame drops/glowing particles	Indicator flag cannot burn Cotton below cannot ignite



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D. Smoke and Halogen Testing – Low-Smoke/Zero-Halogen:

Meets the requirements of the UL1685 Method 1 flame and smoke test, as well as the halogen, smoke, and acid gas requirements of ICEA T-33-655, allowing the cable to be listed and printed “ST1” to indicate compliance with the UL44 standard.

GenFree II Smoke Generation and Halogen Content Test Requirements:

Property or Test	ICEA T-33-655	Type II Thermoset Requirements
Physical Properties		
Hot Creep After Conditioning @ 150°C Elongation Set	Table I	100% max 10% max
Gravimetric Water Absorption @ 75°C	Table II	50 mg/in ² max
Acid Gas Equivalent Per MIL-C-24643	Table III	2% max
Halogen Content Per MIL-C-24643	Table III	0.2% max
Smoke Generation 80 mil Plaque Flaming Mode Ds @ 4 minutes Flaming Mode Dm Non-Flaming Mode Ds @ 4 minutes Non-Flaming Mode Dm	Table III ASTM E662	50 max 250 max 50 max 350 max



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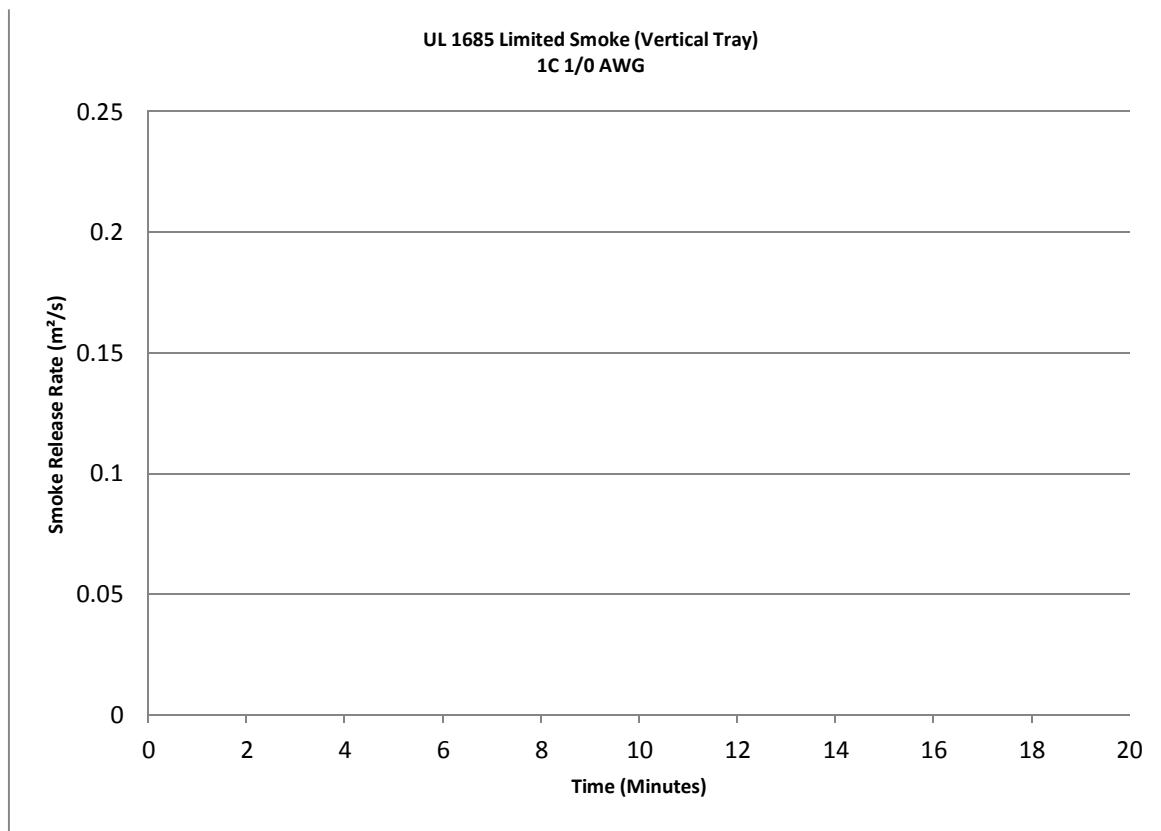
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GenFree II UL 1685 Smoke Testing Results:

Property or Test	UL 44/UL 1685	Requirements
Physical Properties		
Peak Smoke Release Rate	Para. 5.14.7	0.25 m ² /s
Total Smoke Release Rate	Para. 5.14.7	95 m ²

Smoke Release Rate Test:





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E. Sunlight-Resistant: Exceeds the 720 hour weathering test per the UL 44 and UL 854, allowing cable to be marked “SUN RES”.

GenFree II Sunlight Test Requirements:

Property or Test	UL 854 USE-2	Requirements
Physical Properties		
Sunlight-Resistance 720 Hr Xe Arc	Table I	
Tensile Strength Retention		85% min
Elongation Retention		85% min

F. Low Temperature Performance:

Passes the UL 44 cold bend and cold impact tests at -40°C, allowing “-40°C” to be printed on jacket for all three product types.

GenFree II Cold Bend and Impact Test Requirements:

Property or Test	UL 44	Requirements
Physical Properties		
Cold Bend 4 hrs. @ -40°C	Para. 5.11.1	No Cracks
Cold Impact 4 hrs. @ -40°C	Para. 5.11.2	8 of 10 No cracks

G. Oil Resistance:

Insulation passes the oil resistance test per the UL 44 standard, allowing cables to be marked as “OIL RES I”.

GenFree II Oil Resistance Testing Results:

Property or Test	UL 44	Requirements
Physical Properties		
Oil Immersion IRM 902 (PR I) Aged 96 Hr. @ 100°C	Para. 5.16.1	
Tensile Strength Retention		50% min
Elongation Retention		50% min



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H. ROHS/REACH Compliant:

All materials used comply with the RoHS and REACH directives.

VI. CABLE IDENTIFICATION

The surface of the cable shall be printed with the following minimum information at intervals not greater than two feet.

5075 "GENERAL CABLE® (PLANT OF MFG) GENFREE® II 17FREE™ LSZH TYPE USE-2 OR RHH OR RHW-2 (SIZE) 600 V OIL RES I SUN RES -40C ST1* FOR CT USE * (UL) VW-1 DAY/MONTH/YEAR OF MFG SEQUENTIAL FOOTAGE MARK"

**"ST1" and "FOR CT USE" on 1/0 AWG and larger

5125 "GENERAL CABLE® (PLANT OF MFG) GENFREE® II 17FREE™ LSZH TYPE XHHW-2 (SIZE) 600V OIL RES I SUN RES -40C ST1* FOR CT USE * (UL) VW-1 DAY/MONTH/YEAR OF MFG SEQUENTIAL FOOTAGE MARK"

**"ST1" and "FOR CT USE" on 1/0 AWG and larger

5275 "GENERAL CABLE® (PLANT OF MFG) GENFREE® II 17FREE™ LSZH TYPE USE- 2 OR RHH OR RHW-2 (SIZE) 600V OIL RES I SUN RES -40C ST1* FOR CT USE * (UL) VW-1 DAY/MONTH/YEAR OF MFG SEQUENTIAL FOOTAGE MARK"

**"ST1" and "FOR CT USE" on 1/0 AWG and larger

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