ELECTRICAL INSTALLATION REPORT

# ConduitLab Sample Project

| | | | |
|---|---|---|---|
| JOB SITE | 123 Sample Way, Anytown, USA | PREPARED FOR | ConduitLab Community Example |
| PREPARED BY | ConduitLab™ – Electrical Reference Tool | DATE | December 19, 2025 |
| RUN ID | CL-20251219-BFPV7d | | |

| AMPACITY | CONDUCTOR | VOLTAGE DROP | CONDUIT FILL |
|---|---|---|---|
| 53A | 3 AWG Cu THHN | 2.51% | 20.4% |

CONDUITLAB

# Summary Dashboard

RECOMMENDED CONDUCTOR

**3 AWG**

Copper • 90°C

VOLTAGE DROP

**2.51%**

5.22V drop • 202.8V at load

CONDUIT FILL

**20.4%**

11/4" EMT

JAM STATUS

**OK**

No jam risk

## Parameter Summary

| | | | |
|---|---|---|---|
| **Load (A)** | 50 A | **Voltage** | 208V |
| **Material** | Copper | **Insulation** | THHN (90°C) |
| **Wire Size** | 3 AWG | **Ambient Temp** | 35°C |
| **Conductors** | 5 | **Continuous** | Yes |
| **Conduit** | 11/4" EMT | **Circuit Length** | 250 ft |
| **VD Method** | AC Impedance (Exact) | Phase: Three-phase | |

Power Factor: 0.9

## Inspector / Responsible Party Notes

Prepared By

License #

Date

Additional Notes

# Ampacity Summary

FINAL AMPACITY

**53 A**

CONDUCTOR: 3 AWG Cu THHN

## Calculation Breakdown

| Factor | Value | Code Reference |
|---|---|---|
| Ambient Temperature | 35°C → 68°C | — |
| Base Ampacity | 115 A | Table 310.16 |
| Rooftop Adder | + 33°C | NEC 2020 310.15(B)(2) |
| Ambient Temp Correction | × 0.58 | Based on NEC 2020 Table 310.15(B)(1) |
| Conductor Bundling | × 0.80 | Based on NEC 2020 Table 310.15(C)(1) |
| Derated Ampacity | 53.36 A | — |
| Terminal Rating | Not limited | 110.14(C) |
| Final Ampacity | 53 A | — |

Detailed Ampacity Steps → See Appendix A

# Voltage Drop & Conduit Fill

## Voltage Drop Summary

VOLTAGE DROP RESULT

**2.51 %**

Drop Voltage: 5.22 V • Voltage at Load: 202.8 V

| Parameter | Value |
|---|---|
| Load Current | 50 A |
| Conductor | 3 AWG Copper |
| Distance | 250 ft |
| Method | AC Impedance (Tables 8 & 9) |

Detailed VD Steps → See Appendix B

## Conduit Fill Summary

CONDUIT FILL RESULT

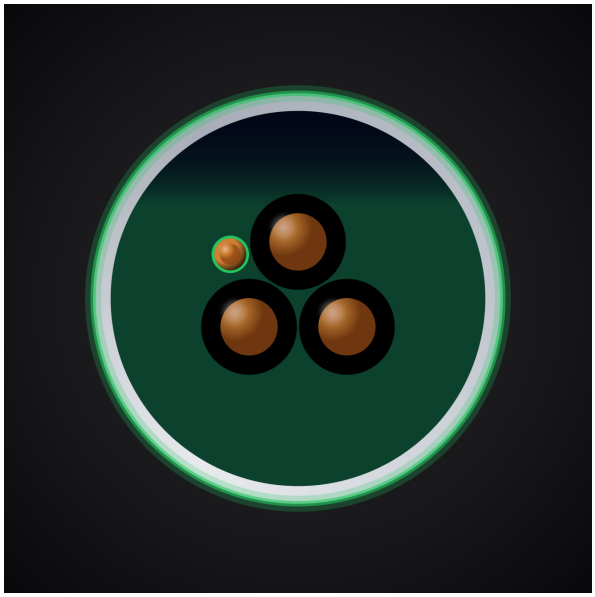
**20.4 %**

Conduit: 11/4" EMT • Wires: 4

| Parameter | Value |
|---|---|
| Total Wire Area | 0.3048 in² |
| Conduit Area | 1.4957 in² |
| NEC Max | 40% |

Detailed Fill Steps → See Appendix B

# Conduit Visualization



*Not to scale. Visualization is schematic and intended for conceptual layout only.*

## Visualization Summary

| Parameter | Value |
|---|---|
| Conduit | 11/4" EMT |
| Wire Count | 4 |
| Total Wire Area | 0.3048 in² |
| Conduit Area | 1.4957 in² |
| Fill Percentage | 20.4% |
| Jam Status | OK |

# Appendix A: Ampacity Forensics

| Step | Detail | Value | Code Reference |
|---|---|---|---|
| input parameters | Input parameters for ampacity calculation | **Parameters validated** | NEC 2020 |
| rooftop correction | Rooftop sunlight temperature adder | **+33°C adder applied** | 310.15(B)(2) • NEC 2020 310.15(B)(2) |
| Ambient Temperature Adjustment | Ambient temperature correction factor lookup | **0.58** | Table 310.15(B)(1) - 90°C Column • Based on NEC 2020 Table 310.15(B)(1) |
| Adjustment for Number of Current-Carrying Conductors | Conductor bundling adjustment factor | **0.8** | Table 310.15(C)(1) • Based on NEC 2020 Table 310.15(C)(1) |
| total derating | Combined derating factor calculation | **0.46399999999999997** | — |
| Required Load Ampacity | Calculate required ampacity for load | **62.50A** | — |
| Base Ampacity Lookup | Base ampacity for 3 AWG Copper at 90°C | **115A** | Table 310.16 • Based on NEC 2020 Table 310.16 |
| Derated Ampacity | Apply derating factors to base ampacity | **53.36A** | — |
| Terminal Rating | Terminal temperature rating limit check | **Not limited (53.36A < 100A)** | Table 310.16 • Based on NEC 2020 110.14(C) |
| final ampacity | Final allowable ampacity | **53.36A** | — |
| wire selection | Recommended wire size selection | **3 AWG** | — |

# Appendix B: Voltage Drop & Conduit Fill Forensics

## Voltage Drop Steps

| Step | Detail | Value | Code Reference |
|---|---|---|---|
| Resistance Lookup | DC resistance per 1000 ft for 3 AWG | **Per Table** | Ch. 9 Tables 8 & 9 |
| Effective Length Used | Circuit distance applied to calculation | **250 ft** | User Input |
| Load Current | Current draw considered for voltage drop | **50A** | User Input |
| Formula Substitution | $Vd = K \times I \times (R \times \cos\theta + X \times \sin\theta) \times L / 1000$ | **5.22 V** | Calculated |
| Final % Drop | Percentage drop at the load | **2.51%** | Calculated |

## Conduit Fill Steps

| Step | Detail | Value | Code Reference |
|---|---|---|---|
| Wire Area Lookup (Table 5) | Individual area for THHN | **0.0762 in²** | Ch. 9 Table 5 |
| Total Wire Area | 4 wires × individual area | **0.3048 in²** | Calculated |
| Conduit Area (Table 4) | 11/4" EMT internal area | **1.4957 in²** | Ch. 9 Table 4 |
| Fill % Calculation | Fill % = (Wire Area ÷ Conduit Area) × 100 | **20.4%** | Calculated |
| Max Fill Check (40%) | Compare against NEC maximum | **Pass** | Ch. 9 Table 1 |

# Appendix C: Citations & Verification

## NEC References

NEC 2020 110.14(C)

NEC 2020 Ch.9 Table 5

NEC 2020 Ch.9 Table 8

NEC 2020 Ch.9 Table 9

NEC 2020 Ch.9 Tables 4 & 5

NEC 2020 Table 310.15(B)(1)

NEC 2020 Table 310.15(C)(1)

NEC 2020 Table 310.16

NEC 310.15(B)(2) - Rooftop Temperature Adjustment

## Verification

| Field | Value |
| --- | --- |
| Export ID | CL-20251219-BFPV7d |
| SHA-256 Checksum | `6641efe1796b588a512291fd123b2bd41dda87e34246c61f1169edba572150c6` |
| Generated | 2025-12-19T14:04:12.273Z |
| Code Edition | NEC 2020 |
| Project | ConduitLab Sample Project |
| Checksum Purpose | Ensures report integrity; matches exported data snapshot. |

# Appendix D: Machine-Readable Data & Legal

**Project Data (JSON)**


```
{
  "loadAmps": "50",
  "material": "Cu",
  "selectedWire": null,
  "calculatedWire": "3 AWG",
  "ambientTemp": 35,
  "conductors": 5,
  "isContinuous": true,
  "insulationType": "90",
  "insulationTypeValue": "THHN",
  "wetLocation": false,
  "terminalTemp": "75",
  "rooftopExposure": true,
  "rooftopHeight": 0.5,
  "isRooftop": true,
  "rooftopAdderC": 33,
  "ambientEffectiveC": 68,
  "voltage": 208,
  "phase": "3",
  "distance": "250",
  "powerFactor": "0.9",
  "conduit": "PVC",
  "vdMethod": "exact",
  "vdLengthSemantics": "one-way",
  "conduitType": "EMT",
  "conduitSize": "1 1/4\"",
  "voltageDropData": {
    "dropVolts": 5.22,
    "dropPercent": 2.51,
    "voltageAtLoad": 202.78
  },
  "conduitFillData": {
    "fillPercent": 20.4,
    "maxFillPercent": 40,
    "wireCount": 4,
    "jammedWireCount": 0,
    "visualJamDetected": false
  }
}
```