2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT

DEPARTMENT OF PUBLIC WORKS & ENGINEERING

CHARTER TOWNSHIP OF MERIDIAN

INGHAM COUNTY, MICHIGAN

2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT

FOR
CHARTER TOWNSHIP OF MERIDIAN

TABLE OF CONTENTS

CHARTER TOWNSHIP OF MERIDIAN

2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT

ADVERTISEMENT FOR BIDS

Sealed proposals will be received by Meridian Township, Ingham County, Michigan, at the Meridian Township Clerk's Office, Municipal Building, 5151 Marsh Road, Okemos, Michigan, 48864, Ph. (517) 853-4000, up to 11:00 a.m., local time on Friday, February 17, 2023, for the installation of a standby generator and automatic transfer switch (ATS), provided by Meridian Township, at the Meridian Township Public Safety Building, 5147 Marsh Road, Okemos, Michigan, 48864, after which time, proposals will be publicly opened and read aloud.

There is no pre-bid meeting. Prospective bidders may come to inspect the site and electrical room of the Public Safety Building by contacting Deputy Township Manager and Director of Public Works & Engineering Dan Opsommer at 517.853.4440 or DPW@meridian.mi.us.

Bids are solicited on a unit price basis. The work involves the following major construction items:

1. Installation of one (1) owner provided standby generator (100kW).
2. Installation of one (1) owner provided ATS (400A).
3. Installation of a reinforced concrete foundation pad.
4. Furnishing and installation of a new 200A 60 Circuit (120/208V) Panel and 200A switch.

All changeovers to the new generator and switches will need to be completed at one time, potentially after hours, to minimize downtime. The Public Safety Building cannot be left without backup power.

Work on the project may commence any time after the "Notice To Proceed" is issued. Work may take place during the winter. Construction shall be completed by May 1, 2023. Completion is defined as being constructed, tested, placed in service, and the site restored.

Each proposal shall be accompanied by a certified check or a bid bond by a recognized surety company similar to a U.S. Government Standard form bid bond, in the amount of five percent (5%) of the bid, payable to the Charter Township of Meridian, Ingham County, Michigan as security for the acceptance of the Contract.

Insurance and bonds are required from the successful bidder for this project; please see pages G-2 thru G-3 for those requirements. *Please note Owner/Contractors Protective Liability is required for all our contracts*.

Copies of the contract documents for the work may be obtained from the Department of Public Works & Engineering at 5151 Marsh Road, Okemos, Michigan. There is a five-dollar ($5.00) fee for mailing contract documents. Contract documents may be obtained via email free of charge. For questions regarding this contract, please contact Deputy Township Manager Dan Opsommer at 517.853.4440 or DPW@meridian.mi.us.

The bidder's agreement to pay prevailing wage rates is one relevant consideration that Meridian Township may make in its determination of which bidder should receive this contract. Meridian Township may thus consider in awarding this contract whether any vendor voluntarily pays employees and sub-contractors, directly upon the site of work, at least the prevailing wages and fringe benefits as determined and published by the United States Department of Labor for the Ingham County area.

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, to award the Contract to other than the low bidder, to award separate contracts for each project and/or phase, to waive irregularities and/or formalities, and in general, to make award in any manner deemed by it, in its sole discretion, to be in the best interest of the Owner.

INSTRUCTIONS TO BIDDERS

1. PROPOSALS

Proposals must be made upon the forms provided, without modifications or changes and all other data submitted as required.

The proposal must be enclosed in a sealed envelope marked “Bid Proposal – 2023 Public Safety Building Standby Generator Contract" clearly indicating the name and address of the bidder, and filed at the place and by the time specified in the Advertisement.

2. BASIS OF PROPOSALS

Proposals are solicited on the basis of unit prices for the entire work of the contract. Proposals may be submitted for any one or all of the projects or phases, as may be applicable.

The right is reserved by the Owner to reject any and all bids, to award the Contract to other than the low bidder, to award separate Contracts for each project and/or phase, to waive irregularities and/or formalities, and in general, to make award in any manner deemed by it, in its sole discretion, to be in the best interest of the Owner.

3. BID DEPOSITS

Each proposal shall be accompanied by a certified check, or bid bond from a recognized surety company, in the amount of five percent (5%) of the total amount of the bid, payable to the order of the Owner, to be forfeited to the Owner in case of failure on the part of the successful bidder to enter into the attached form of Contract to do the work covered by such Proposal at the price and within the time stated therein. The bid deposit of all except the successful bidder will be returned within four weeks after opening of bids. The bid deposit of the successful bidder will be returned within 48 hours after the executed Contract has been finally approved by the Owner.

4. QUALIFICATION OF BIDDERS

It is the intention of the Owner to award the Contract(s) to contractor(s) fully capable, both financially and as regards experience to perform and complete all work in a satisfactory manner. Evidence of such competency must be furnished, including a listing of similar projects which the bidder has satisfactorily undertaken and completed.

5. INTERPRETATION OF DOCUMENTS

If the bidder is in doubt as to the true meaning of any part of the plans, specifications or Contract Documents, he may submit to the Engineer a written request for an interpretation thereof. Any interpretation made in response to such query will be mailed or duly delivered to each prospective bidder. The Owner will not be responsible for any other explanation or interpretation of the Contract Documents.

6. REQUIREMENT OF SIGNING BIDS

Bids which are not signed by the individual making them shall have attached thereto a power of attorney evidencing authority to sign the bid in the name of the person for whom it is signed.

Bids, which are signed by a partnership, shall be signed by all of the partners or by an attorney-in-fact. If signed by an attorney-in-fact, there shall be attached to the bid a power of attorney evidencing authority to sign the bid, executed by the partners.

Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officers of the corporation manually written below the corporate name following the word “By”. If such a bid is manually signed by an officer other than the president of the corporation, a certified copy of a resolution of the board of directors evidencing the authority of such official to sign the bid shall be attached to it. Such a bid shall also bear the attested signature of the secretary of the corporation and the corporate seal.

7. EXECUTION OF AGREEMENT

The bidder to whom an award is made will be required to enter into the written contract included herein, within ten (10) calendar days after being notified of the acceptance of his bid and receipt by him of the copies of the documents to be executed. In case of failure to comply with this requirement, he may be considered to have abandoned all his rights and interests in the award and his certified check or amount of bidder's bond may be declared to be forfeited to the Owner and the Contract may be awarded to another bidder.

8. INSURANCE (Ref. General Conditions – GC.2)

The contractor will be required to carry Worker's Compensation Insurance, Bodily Injury and Property Damage, Builder's Risk Insurance and Owner's Protective Liability in the amounts specified in the General Conditions. Certificates of such insurance must be attached to each copy of the executed Contract Documents.

9. BONDS (Ref. General Conditions – GC.1)

The successful bidder will be required to furnish for each set of executed Contract Documents and conformed copies thereof an original completed Performance Bond, and Labor and Material Bond with surety acceptable to the Owner as set forth in the General Conditions.

10. BIDDER'S RESPONSIBILITY FOR EXAMINING PLANS AND SITE

At the time of opening bids, each bidder will be presumed to have made a personal investigation of the site of the work and of existing structures, and to have read and be thoroughly familiar with the plans, specifications and Contract Documents (including all addenda). He shall determine to his own satisfaction the conditions to be encountered, the nature of the ground, difficulties involved in completing the Contract and all factors affecting the work proposed under this Contract.

The bidder to whom this contract is awarded will not be entitled to any additional compensation by reason of his failure to fully acquaint himself with the conditions at the site or by his failure to fully examine the plans, specifications and Contract Documents.

11. NON-DISCRIMINATION IN EMPLOYMENT

The Contractor shall adhere to all applicable Federal, State and local laws, ordinances, rules and regulations prohibiting discrimination with regards to employees and applicants for employment. The contractor and his/her subcontractors shall not discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions or privileges of employment, including a benefit plan or system or a matter directly or indirectly related to employment, because of race, color, religion, national origin, sex, age, height, weight, condition of pregnancy, marital status, physical or mental limitation, disability, source of income, familial status, educational association, sexual orientation, gender identity or expression, or HIV status. Breach of this section shall be regarded as a material breach of this Contract.

PROPOSAL

TO: Charter Township of Meridian
5151 Marsh Road
Okemos, MI 48864

RE: 2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT

Board of Trustees:

The undersigned, as a bidder, hereby declares that these bids are made in good faith, without fraud or collusion with any person or persons bidding on the same Contract, that he has read and examined the Advertisement, Instruction to Bidders, Proposal, Contract, General Conditions, Specifications, Special Provisions and Plans and understands all of the same; that he or his representative has made personal investigation at the site and has informed himself fully with regard to the conditions to be met in the execution of the Contract.

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, to award the Contract to other than the low bidder, to award separate contracts for each project and/or phase, to waive irregularities and/or formalities, and in general, to make award in any manner deemed by it, in its sole discretion, to be in the best interest of the Owner.

It is further understood and agreed by the undersigned that any qualifying statement or conditions made to this proposal as originally published, as well as any interlineation, erasures, omissions or entered wording obscure as to its meaning, may cause the bid to be declared irregular and may be cause for rejection of the bid.

The undersigned agrees to start work within ten (10) days of issuance of the Notice to Proceed. The undersigned further agrees to complete all work covered by this Proposal to the point of use of the project by the Owner by the completion date stated in the Advertisement or within the number of calendar days stated in the Advertisement; and that for all days thereafter until final acceptance, there will be charged, as liquidated damages, the sum of $1,000.00 per calendar day per project for each and every day thereafter until final acceptance.

The undersigned hereby proposes to perform everything required to be performed and to furnish all labor, materials, tools, equipment and all utility and transportation services necessary to complete in a workmanlike manner all the work to be done under this Contract, including addenda thereto, for the sums set forth in the following Bidding Schedule:

PROPOSAL

ITEM	DESCRIPTION	QTY		UNIT PRICE	AMOUNT
1	Standby Generator	1	LS	$_____	$_____
2	Automatic Transfer Switch	1	LS	$_____	$_____
3	Standby Generator Concrete Pad	1	LS	$_____	$_____
4	Generator, Removal	1	LS	$_____	$_____
5	Utility Work	1	LS	$_____	$_____
6	200A Panel & Switch	1	LS	$_____	$_____
7	Site Restoration	1	LS	$_____	$_____
8	Allowance, Gas*	1	LS	$10,000.00	$10,000.00
9	Allowance, Electric*	1	LS	$3,000.00	$3,000.00

** The Township will only reimburse actual costs. Receipts must be provided.*

TOTAL BID: $_____

Give the name of the Owners and dates of other projects which the Bidder has constructed or has had responsible charge of construction:

OWNER NAME & PROJECT DESCRIPTION	**DATE**

The Bidder acknowledges that his bid is in accordance with the information contained in Addendum No.____, ____, ____, and _____.

The Bidder is hereby reminded that the Pay Items listed under the Bidding Schedule are the only items for which he will receive payment under this Contract. In the event that lesser or greater quantities of specific Pay Items are required to complete the work and place the system in operation, the total amount bid for the specific item will be adjusted by the unit price bid to the actual quantities utilized. In the event that an error is made in extending the unit prices, the Bidder is hereby notified that the unit prices as bid, will govern in determining the Total Base Bid. It is expressly understood and agreed that the Total Base Bid is the basis for establishing the amount of Bid Security on this Proposal and for comparison of bids only and is not to be constructed as a lump sum Proposal.

The undersigned attaches hereto a certified check or bidder's bond in the sum of not less than five percent (5%) of the Total Base Bid as required by the Advertisement and Instructions to Bidders and the undersigned agrees that in case he shall fail to fulfill his obligations under this Proposal and/or shall fail to furnish bonds, as specified, the Owner may, at its option determine that the certified check or amount of said certified check or bidder's bond accompanying this Proposal has been forfeited to the Owner, but otherwise the said certified check or bidder's bond shall be returned to the undersigned upon the execution of the Contract and acceptance of the bond.

The undersigned further agrees that this proposal shall be effective for a period of sixty (60) days from the date established for opening of all bids.

Date _____ Company Name _____

By _____ Address _____
Signature

_____ _____
Printed Name

Title _____ Phone Number _____

Email Address _____

The vendor's agreement to pay prevailing wage rates is one relevant consideration that Meridian Township may make in its determination of which bidder should receive this contract. Meridian Township may thus consider in awarding this contract whether any vendor voluntarily pays employees and sub-contractors, directly upon the site of work, at least the prevailing wages and fringe benefits as determined and published by the United States Department of Labor for the Ingham County area.

Will the bidder voluntarily pay its employees and sub-contractors, directly upon the site of work, at least the prevailing wages and fringe benefits as determined and published by the United States Department of Labor for the Ingham County area. Please circle one below:

Yes or No

2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT

THIS CONTRACT, dated _____ by and between _____, hereinafter called the "CONTRACTOR", and Meridian Charter Township, 5151 Marsh Road, Okemos, MI 48864, hereinafter called the "OWNER".

WITNESSETH, that the CONTRACTOR and the OWNER for the consideration herein agree as follows:

ARTICLE I. SCOPE OF WORK.

The CONTRACTOR shall perform everything required to be performed and shall provide and furnish all labor, materials, necessary tools, expendable equipment and all utility and transportation services required to perform and complete in a workmanlike manner all the work required for constructing the project as described in the Advertisement and Proposal and for performing all related work for the OWNER, required by and in strict accordance with the plans and specifications, including any and all addenda, and other Contract Documents mentioned and made a part hereof.

ARTICLE II. THE CONTRACT PRICE.

The OWNER shall pay for constructing the project complete with all labor, materials, equipment, appurtenances, surface restoration and related work in strict accord with the Plans and Specifications, ready for use, the unit prices as listed in the Proposal and herein made a part of this Contract. Payment shall be made to the CONTRACTOR in accordance with and subject to the conditions specified under General Conditions.

ARTICLE III. TIME.

Time is of the essence in the performance of this contract. The CONTRACTOR agrees to start work within ten (10) days of issuance of the Notice to Proceed and to fully complete the work so as to permit use of the project by the OWNER within the number of calendar days or by the completion date listed in the Advertisement.

ARTICLE IV. DELAYS AND DAMAGES.

If the CONTRACTOR refuses or fails to prosecute the work, or any separate part thereof, with such diligence as will insure its substantial completion, ready for operation within the number of consecutive calendar days specified herein, or any extension thereof, or fails to complete said work within such time, the OWNER may, by written notice to the CONTRACTOR, terminate the CONTRACTOR's right to proceed with the work or such part of the work as to which there has been delay. In such event, the OWNER may take over the work and prosecute the same to completion by contract or otherwise, and the CONTRACTOR and his sureties shall be liable to the OWNER for any excess cost occasioned thereby. If the CONTRACTOR's right to proceed is so terminated, the OWNER will take possession of and utilize in completing work such materials, appliances, and plant as may be on the site of the work and necessary therefore.

If the OWNER does not terminate the right of the CONTRACTOR to proceed, the CONTRACTOR shall continue to work, in which event the actual damages for the delay will be impossible to determine and in lieu thereof the CONTRACTOR shall pay the OWNER the sum of one thousand dollars ($1,000.00) per day as fixed, agreed, and liquidated damages for each calendar day of delay until the work is substantially completed, ready for operation and the CONTRACTOR and his sureties shall be liable for the amount thereof. However, the right of the CONTRACTOR to proceed shall not be terminated or the CONTRACTOR charged with liquidated damages because of any delays in the completion of the work due to unforeseeable causes beyond control and without the fault or negligence of the CONTRACTOR, including, but not restricted to acts of God, or of the public enemy, acts of the OWNER, fires, floods, epidemics, quarantine restrictions, delays of subcontractors due to such causes, if the CONTRACTOR shall, within ten (10) days from the beginning of any such delay (unless the OWNER shall grant a further period of time prior to the date of final settlement of the Contract) notify the OWNER in writing of the cause of delay and extend the time for completing the work when, in OWNER's judgement, the finding of fact justify such an extension and OWNER's findings of fact thereon shall be final and conclusive on the parties thereto. In no event shall bankruptcy or labor disputes, or the like, either of CONTRACTOR or any of its subcontractors or suppliers, be considered as an unforeseeable cause beyond the control and without the fault or negligence of the CONTRACTOR.

ARTICLE V. COMPONENT PARTS OF THIS CONTRACT.

This Contract consists of the following component parts, all of which are as fully a part of the Contract as if herein set out verbatim, or, if not attached: 1) Advertisement, 2) Instructions to Bidders, 3) Proposal, 4) Addenda, 5) Contract, 6) Bonds and Insurance, 7) General Conditions, 8) General Specifications, 9) Ingham County Department of Transportation and Roads Specifications, 10) Standard Specifications, 11) Special Provisions, 12) Plans, and 13) Notice to Proceed.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed in one (1) original counterpart the day and year first above written.

CONTRACTOR

WITNESS:

By: _____ _____

Title: _____

Date: _____

CHARTER TOWNSHIP OF MERIDIAN
OWNER

WITNESS:

By: _____ _____
Dan Opsommer

Title: Deputy Township Manager
Director of Public Works & Engineering

Date: _____

NOTICE OF AWARD

Dated: _____

TO: _____
_____

ADDRESS: _____
_____

CONTRACT: **2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT**

You are notified that your Bid dated _____, for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for **2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT.**

The Contract Price of your Contract is: **$_____.**

You must comply with the following conditions within 10 days of the date you receive this Notice of Award.

1. Deliver to the OWNER, electronically or hard copies, **one** fully executed Contract. The Contract Documents must bear your signature on page C-3.

2. Deliver with the executed Contract Documents the Contract security (Bonds and Insurance) as specified in General Conditions (GC).

3. If not listed as the owner, president, or partner, we need a letter (on letterhead) stating the person signing contract, has permission to sign the contract.

Failure to comply with these conditions within the time specified will entitle OWNER to consider your Bid in default, to annul this Notice to Award and to declare your Bid security forfeited.

Within ten days after you comply with the above conditions, OWNER will return to you one fully executed counterpart of the Contract Documents.

CHARTER TOWNSHIP OF MERIDIAN

By: _____
Dan Opsommer
Deputy Township Manager
Director of Engineering & Public Works

NOTICE TO PROCEED

Dated: _____

TO: _____
_____

ADDRESS: _____
_____

CONTRACT: **2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT**

You are notified that the Contract Times under the above Contract will commence to run on _____. Within 10 days, you are to start performing your obligations under the Contract Documents. In accordance with Article III of the Contract, the date of Completion is May 1, 2023.

Deliver to **OWNER** an acknowledged copy of this Notice to Proceed.

MERIDIAN TOWNSHIP

By: _____
Dan Opsommer
Deputy Township Manager
Director of Public Works and Engineering

ACKNOWLEDGEMENT OF ACCEPTANCE OF NOTICE TO PROCEED

CONTRACTOR acknowledges acceptance of this Notice to Proceed this _____ day of _____, 2023.

By: _____
(Contractor)

GENERAL CONDITIONS

INDEX

GC.1 CONTRACT SECURITY

The Contractor shall furnish a surety bond, by a duly authorized surety company satisfactory to the Owner, in an amount equal to 100 percent (100%) of the Contract price as security for the faithful performance of this Contract. The Contractor shall also furnish a separate surety bond, by a duly authorized surety company satisfactory to the Owner, in an amount equal to 100 percent (100%) of the Contract price as security for the payment of all persons performing labor and/or furnishing materials.

The surety company writing the bid, performance, labor and material, and maintenance bond shall be: 1) acceptable to the Owner, 2) be listed in the Federal Register as published by the U.S. Department of Treasury under most recently revised Circular 570; 3) have an A.M. Best Company's Insurance reporting rating of no less than A- (Excellent); and 4) authorized to do business in the State of Michigan by the Michigan Department of Licensing & Regulatory Affairs Office of Financial and Insurance Regulations. Upon request, the Contractor shall submit evidence of such insurance.

GC.2 CONTRACTORS' AND SUBCONTRACTORS' INSURANCE

The Contractor shall not commence work under this Contract until he/she has obtained all the insurance required under this section and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his/her subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Contractors and subcontractors are required to file with the Owner completed certificates of insurance, as evidence that they carry adequate insurance to comply with the requirement of this section. New Certificates of Insurance shall be furnished to the Owner at the renewal date of all policies named on these certificates.

A. <u>Policies, Coverages, and Endorsements</u>

The Contractor agrees to maintain, or to cause its personnel providing services under this Contract to maintain, at its sole cost and expense or the cost and expense of his personnel, the following insurance policies, with the specified coverages and limits, to protect and insure the Owner and Contractor against any claim for damages arising in connection with Contractors responsibilities or the responsibilities of Contractors personnel under this Contract and all extensions and amendments thereto.

1. Commercial General Liability

a.	General Aggregate	$2,000,000
b.	Each Occurrence	$1,000,000

Such insurance shall include, but not be limited to, coverage for:
Comprehensive form, Premises-operations, Explosion and collapse hazard, Underground hazard, Products/completed operations hazard, Contractual insurance, Broad form property damage, Independent contractor, Personal injury

2. Workers' Compensation & Employer' Liability (if applicable)

a.	Medical & Indemnity	Statutory Requirements
b.	Bodily Injury by Accident	$500,000 Each Accident
c.	Bodily Injury by Disease	$500,000 Each Employee
d.	Bodily Injury by Disease	$500,000 Policy Limit
e.	Employers Liability	$500,000

3. Automobile Liability

Including hired and non-owned Automobiles $1,000,000 (Combined Single Limit)
Such insurance shall include, but not be limited to, coverage for:
Comprehensive form, Owned vehicles, Hired vehicles, Non-owned vehicles

GC.2 CONTRACTORS' AND SUBCONTRACTORS' INSURANCE (Cont'd.)

B. Builder's Risk Insurance (Fire and Extended Coverage)

Until the project is completed and accepted by the Owner, the Contractor is required to maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portion of the project for the benefit of the Owner, the Contractor, and subcontractors as their interests may appear.

C. Owner's Protective Liability

The Contractor shall procure and shall maintain during the life of this Contract Owner's/Contractor's Protective Liability Insurance, listing the Owner as the named insured. The minimum limit of liability shall be not less than $1,000,000.00 per occurrence/aggregate.

D. Insured Parties

All policies shall contain a provision naming the Owner (and its officers, agents and employees) as Additional Insured parties on the original policy and all renewals or replacements during the term of this Contract.

E. Acceptable Insurance Companies

All insurance companies required by this section shall be: 1) acceptable to the Owner; 2) authorized to do business in the State of Michigan by the Michigan Department of Licensing & Regulatory Affairs Office of Financial and Insurance Regulations, and 3) have an A.M. Best Company's Insurance reporting rating of no less than A- (Excellent). Upon request, the Contractor shall submit evidence of such insurance.

F. Indemnification and Hold Harmless

The Contractor shall, at its own expense, protect, defend, indemnify and hold harmless the Owner and its elected and appointed officers, employees, and agents from all claims, damages, costs, lawsuits and expenses, including, but not limited to, all costs for administrative proceedings, court costs and attorney fees that they may incur as a result of any acts, omissions, or negligence of the Contractor, its subcontractors, sub-subcontractors or any of their officers, employees, or agents. This includes but is not limited to injury or death to any person or persons, including the contractors employees, and damage to property. The furnishing by the Contractor of any insurance required by this Contract, or the acceptance or approval thereof by the Owner as provided in this Contract, or otherwise, shall not diminish the Contractor's obligation to fully indemnify the Owner, its elected and appointed officers, employees, and agents as required in this section.

The Contractor shall not cancel or reduce the coverage of any insurance required by this section without providing 30-day prior written notice to the Owner. All such insurance must include an endorsement whereby the insurer shall agree to notify the Owner immediately of any reduction by the Contractor. The Contractor shall cease operations on the occurrence of any such cancellation or reduction, and shall not resume operations until new insurance is in force.

GC.3 QUALIFICATION FOR EMPLOYMENT

The Contractor shall employ competent laborers and mechanics for the work under this Contract, and shall comply with all applicable regulations of the United States Department of Labor and any other agencies having jurisdiction.

GC.4 PROGRESS SCHEDULE

The Contractor, if requested by the Owner, immediately after being awarded the Contract, shall prepare and submit to the Owner and its representative an estimated progress schedule for the work in relation to the entire project. This schedule shall indicate the dates for the starting and completion of the various stages of construction.

GC.4 PROGRESS SCHEDULE (Cont'd.)

If the Contractor chooses to work overtime, they will be backcharged for inspection. Overtime is any Township recognized holiday and/or any time other than 8:00 a.m. to 5:00 p.m., local time, Monday through Friday. No work will be allowed at the site prior to 7:00 a.m. or after 7:00 p.m., or dusk, of any working day. No work will be allowed on Sundays with the exception of work necessitated by an emergency.

GC.5 ACCIDENT PREVENTION

Precaution shall be exercised at all times for the protection of persons (including employees) and property, and hazardous conditions shall be guarded against or eliminated. The Contractor is entirely responsible for all aspects of job safety and shall execute the work under this Contract in strictest conformance with all state and local safety codes, rules and regulations.

GC.6 CONTRACT PRICE SCHEDULE

The Contractor, if requested by the Owner, shall submit to the Owner a cost breakdown for the various items of the work. The schedule shall be prepared in a manner acceptable to the Owner as to both form and completeness and supported by data as necessary to substantiate its correctness.

GC.7 PAYMENT TO CONTRACTOR

The Contractor shall submit semi-monthly, or at longer intervals, if he so desires, an invoice covering work previously performed for which he believes payment, under the Contract terms, is due, and shall deliver said invoice to the Owner. Each request for payment shall be accompanied by a statement certifying that all bills for labor and materials have been paid up for all previous pay requests.

Each progress payment request shall be paid within one of the following time periods, whichever is later:

A. Thirty (30) days after the Owner has certified that the work is in place in the portion of the facility covered by the applicable request for payment in accordance with the documents.

B. Fifteen (15) days after the Owner has received the funds with which to make the progress payment from a department or agency of the federal or state government, if any funds for the facility are to come from either of these sources.

To assure proper performance of the Contract by the Contractor, the Owner shall retain ten percent (10%) of the dollar value of all work in place until the work is fifty percent (50%) in place. After the work is fifty percent (50%) in place, additional retainage shall not be withheld unless the Owner determines that the Contractor is not making satisfactory progress, or for other specific cause relating to the Contractor's performance under the Contract. In the event of such a determination the Owner may retain up to, but not to exceed, ten percent (10%) of the dollar value of the entire contract.

Any funds retained by the Owner shall not exceed the prorated share of the Owner's matching requirement if the project is funded, in part, with federal or state funds. Any retained funds shall not be commingled with other funds of the Owner and shall be deposited in an interest-bearing account in a regulated financial institution.

At any time after ninety-four percent (94%) of the work under the Contract is in place and at the request of the Contractor, the Owner shall release the retainage plus interest, only if the Contractor provides to the Owner an irrevocable letter of credit in the amount of the retainage plus interest, issued by a bank authorized to do business in the State of Michigan, containing terms mutually acceptable to the Contractor and Owner.

Retainage shall be released to the Contractor together with the final progress payment.

GC.7 PAYMENT TO CONTRACTOR (Cont'd.)

Owner and Contractor agree that disputes concerning retainage, at the option of the Owner, shall be submitted to the decision of the agent as provided in Section 4 of Act 524 of the Michigan Public Acts of 1980 (MCLA 125.1564; MSA 5.2949 (104)) and that interest earned on retainage shall be released to the Contractor together with the final progress payment except as provided in said Section 4 of 1980 PA 524.

The final progress payment request by the Contractor shall include:

A. A final invoice in a form satisfactory to the Owner.

B. A sworn statement certifying that all bills for labor and materials have been paid by the Contractor.

C. A sworn statement waiving any further claims (other than the final payment, retainage and interest, if any) by the Contractor against the Owner.

D. A certificate from Contractor's bonding company approving issuance of final payment.

All payments shall take due account of additions to or deductions from the Contract price as herein provided.

The acceptance by the Contractor of payment on the final progress payment request shall be conclusive evidence of Contractor's acceptance and approval of estimates, accounting and deductions, and of full payment by the Owner for all work, labor, materials and services done or furnished hereunder, and a full satisfaction, discharge, release and waiver of all claims and demands of or on behalf of the Contractor, its agents or employees against the Owner arising out of this agreement.

GC.8 SUBCONTRACTING

The Contractor shall not award any work to any subcontractor, supplier, manufacturer or fabricator without prior written approval of the Owner, which approval will not be given until the Contractor submits a written statement to the Owner concerning the proposed award to the subcontractor. Said statement shall contain such information as the Owner may require.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract documents insofar as applicable to the work of the subcontractors, and to give the Contractor the same power of terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract documents.

Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

GC.9 ASSIGNMENTS

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this Contract.

GC.10 EXTRAS

Except as otherwise herein provided, no charge for any extra work or materials will be allowed unless the same has been ordered in writing by the Owner and the price stated in such order.

GC.11 CHANGES IN WORK/PAYMENT ADJUSTMENTS

Adjustments, if any, in the amounts to be paid by the Contractor by reason of changes in, additions to, or deductions from the work to be performed or the materials to be furnished under this Contract, shall be made on the basis of the acceptable unit prices or lump sums submitted by the Contractor covering such changes, additions or deductions.

Failing an acceptable lump sum or unit price basis for extra work caused by changes or additions, the Contractor may be directed to proceed with extra work on the basis of actual total cost of:

A. Labor, including foremen (including fringe benefits);

B. Materials entering permanently into the work;

C. The ownership or rental cost of construction plant and equipment during the time of use on the extra work at a rate not to exceed AGC rates;

D. Power and consumable supplies for the operation of power equipment;

E. Insurance;

F. Social Security and unemployment contributions.

To the cost of the six items above, there shall be added a fixed fee, to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of the work. The single fee shall be compensation to both the Contractor and/or subcontractor to cover the cost of supervision, overhead, bond, profit and any other general expenses.

Failing an acceptable lump sum or unit price basis for adjustment for any decrease in work caused by changes or deductions, the amount of such adjustment may be determined on a similar basis to that described for extra work, with the Contractor furnishing all pertinent cost data from his/her books and records that may be available and necessary for determination of the amount of adjustment.

All changes in, additions to, or deductions from the work specified shall be made only by written order by the Owner or by an authorized representative of the Owner. No claim for extra work will be allowed, unless ordered in writing as above stated, and the claim therefore presented in writing by the Contractor on or before the fifth (5th) day of the month following that in which the work was done.

GC.12 TIME OF MAKING CLAIMS

If the Contractor shall claim compensation or extension of time for any losses, damages, or delays sustained by reason of the acts of the Owner or its agents or other causes, he/she shall make a written statement of the nature of the loss, damage, or delay sustained to the Owner, within ten (10) days after the sustaining of such loss, damage, or delay. At the time of delivery and as a part of the Contractor's Declaration as hereinafter provided, the Contractor shall file with the Owner an itemized statement of the details and amounts of the loss, damage, or delay, and unless the statement shall be made as thus required, the Contractor's claim for compensation or extension of time shall be forfeited and invalidated, and he/she shall not be entitled to payment or extension of time on account of any such loss, damage or delay.

GC.13 MATERIALS, SERVICES, AND FACILITIES

It is understood that except as otherwise specifically stated in the Contract documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature and all construction facilities whatsoever necessary to execute, complete, and deliver the work within the specified time.

Any work necessary to be performed after regular working hours, or Sundays and legal holidays, shall be performed without additional expense to the Owner.

GC.14 TERMINATION FOR BREACH

In the event that any of the provisions of this Contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of its intention to terminate the Contract, such notice to contain the reasons for terminating the Contract, and unless within ten (10) days after the serving of such notice upon the Contractor, the violation shall cease and satisfactory arrangements for correction be made, the Contract shall cease and terminate. In the event of a termination of the Contract, the Owner shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the Contract.

However, if the Surety does not commence performance thereof within 30 days from the date of mailing said Notice of Termination to such Surety, the Owner may take over the work and prosecute the same to completion by contract for the account and at the expense of the Contractor. The Contractor and his Surety shall be liable to the Owner for any excess cost incurred by the Owner in completing the work, and Owner may take possession of and utilize in completing the work, all materials, appliances and plants as may be on the site of the work and necessary therefore.

GC.15 OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF

The Owner may withhold a sufficient amount of any payment otherwise due to the Contractor to cover:

A. Payments that may be past due and payable for just claims for labor, materials, or equipment furnished in and about the performance of the work on the project under this Contract.

B. For defective work not remedied.

C. For failure of the Contractor to make proper payments to his subcontractors.

The Owner shall disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment therefrom. Any payment so made by the Owner shall be considered as a payment made under the Contract by the Owner to the Contractor. The Owner will render to the Contractor a proper accounting of all funds disbursed in behalf of the Contractor.

GC.16 SUPERINTENDENCE

The Contractor shall give his/her personal superintendence to the work or have a competent foreman or superintendent, satisfactory to the Owner, on the worksite at all times during work progress, with authority to act for the Contractor.

GC.17 NOTICE AND SERVICE THEREOF

Where in any of the Contract documents there is any provision in respect to the giving of any notice, such notice shall be deemed to have been given; as to the Owner, when written notice shall be delivered to the Owner, or shall have been placed in United States mails with first-class postage pre-paid addressed to the chief executive officer of the Owner at the place where the bids or proposals for the Contract were opened; as to the Contractor, when a written notice shall be delivered to the chief representative of the Contractor, at the site of the project or by mailing such written notice in the United States mails with first-class postage pre-paid addressed to the Contractor at the place stated in the papers prepared by him to accompany his proposal as to the address of his permanent place of businesses; as to the Surety, when a written notice is placed in the United States mails with first-class postage pre-paid addressed to the Surety at the home office of such Surety or to its agent or agents who executed bonds in behalf of such surety.

GC.18 COMPLIANCE WITH LAW, APPLICABLE LAW, AND VENUE

The Contractor shall comply with all applicable Federal, State, County, and Municipal laws, ordinances, rules and regulations.

This contract shall be construed according to the laws of the State of Michigan.

The venue for the bringing of any legal or equitable action under this contract shall be the County of Ingham, of the State of Michigan. In the event that any action is brought under this Contract in Federal Court, the venue for such action shall be the Federal Judicial District of Michigan, Western District, Southern Division.

GC.19 PERMITS

The Township will secure and pay for the Building Permit from the Meridian Township Building Department. All other permits or licenses which may be needed for prosecution of the work are to be obtained by the Contractor at the Contractor's expense.

GC.20 ROYALTIES AND PATENTS

The Contractor shall pay for all royalties and patents, and defend all suits or claims for infringement on any patent right, and shall save and hold harmless the Owner from loss on account thereof.

GC.21 INSPECTIONS

The Owner and its representative shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide facilities for such access and for inspection.

The Owner and/or its representative shall have the right to reject materials and workmanship which are defective, or require their correction. Work on the project may be ordered terminated until correction is made. Rejected workmanship shall be satisfactorily corrected, and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct condemned work and remove rejected materials within a reasonable time, fixed by written notice, the Owner may remove them and charge the expense to the Contractor.

Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed, by removing or tearing out same, the Contractor shall on request promptly furnish all necessary facilities, labor, and materials. If the work is found to be defective in any material respect, due to fault of the Contractor or their subcontractors, they shall defray all the expenses of examination and satisfactory reconstruction. If, however, the work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15 percent (15%) shall be allowed the Contractor.

GC.22 CORRECTION OF WORK AFTER FINAL PAYMENT

Neither the final payment nor any provision in the Contract documents nor partial or entire occupancy of the premises by the Owner shall relieve the Contractor of the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law, and, upon written notice, he/she shall repair any defects due thereto and pay for any damage due to other work resulting therefrom, which shall appear within **one year** after date of completion and acceptance.

GC.23 PROTECTION OF WORK

The Contractor shall continuously maintain adequate protection of all his/her work from damage and shall protect the Owner's and adjacent property from injury arising in connection with this Contract, and shall be responsible for all damage and/or injury caused by or arising out of his operations.

GC.24 USE OF JOB SITE

The Contractor shall confine his/her equipment apparatus, the storage of materials and operations of his/her workmen to limits indicated by law, ordinances, permits or directions of the Owner and shall not encumber the premises with his materials.

GC.25 "OR EQUAL" CLAUSE

Whenever in any of the Contract documents an article, material or equipment is defined by describing a proprietary product, or by using the name of a manufacturer or vendor, the term "or equal" if not inserted, shall be implied. The specific article, material or equipment mentioned shall be understood as indicating the type, function, minimum standard of design, efficiency, and quality desired and shall not be construed in a manner so as to exclude manufacturer's products of comparable quality, design and efficiency. The Contractor shall comply with the requirement of the Contract documents relative to the Owner's approval of materials and equipment before they are incorporated in the project.

GC.26 PLANS AND SPECIFICATIONS

The Contractor shall keep on the worksite a copy of the drawings and specifications and shall at all times give the Owner access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like affect as if shown or mentioned in both. In case of difference between drawings and specifications the specifications shall govern. In any case of discrepancy in the figures, drawings or specifications, the matter shall be immediately submitted to the Owner, without whose decision said discrepancy shall not be adjusted by the Contractor, save only at his/her own risk and expense.

The Owner shall furnish from time to time such detail drawings and other information as he/she may consider necessary, unless otherwise provided. The Contractor shall keep such drawings at the site of the work.

GC.27 OWNER'S RIGHT TO DO WORK

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the Owner three (3) days after given written notice to the Contractor and his/her Surety may, without prejudice to any other remedy the Owner may have, make good such deficiencies and may deduct the cost thereof from the payment due to the Contractor.

GC.28 CLEANING UP

The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish caused by his/her employees or work, and at the completion of the work he/she shall remove all his/her rubbish from and about the work and all his/her tools, equipment, scaffolding and surplus materials and shall leave his/her work clean and ready for use. In case of dispute, the Owner may remove the rubbish and surplus materials and charge the cost to the several Contractors in proportion to the amounts as shall be determined to be just.

GC.29 REPORTS, RECORDS AND DATA

The Contractor and each of his/her subcontractors shall submit to the Owner such schedules of quantities, costs, progress schedules, payrolls, reports, estimates, records, and other data as the Owner may request concerning work performed or to be performed under this Contract.

GC.30 NON-DISCRIMINATION IN EMPLOYMENT

The Contractor shall adhere to all applicable Federal, State and local laws, ordinances, rules and regulations prohibiting discrimination with regards to employees and applicants for employment. The Contractor, as required by law, shall not discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions or privileges of employment, or a matter directly or indirectly related to employment because of race, color, religion, national origin, age, sex, height, weight, marital status, or handicap that is unrelated to the individual's ability to perform the duties of a particular job or position. Breach of this section shall be regarded as a material breach of this Contract.

GC.31 DEFINITIONS

The following terms as used in these Contract documents are respectively defined as follows:

(a)	"Contractor"	The person, firm or corporation to whom the within Contract is awarded by the Owner and who is subject to the terms hereof.
(b)	"Subcontractor"	A person, firm or corporation other than a Contractor, supplying labor and materials or labor for work at the site of the project.
(c)	"Project"	The total construction proposed by the Owner to be constructed in part or in whole pursuant to the within Contract.
(d)	"Work on the Project"	Work to be performed, including work normally done, at the location of the project.
(e)	"Surety"	Any person, firm or corporation that has executed, as surety, the Contractor's performance and/or labor and material bonds securing the attached Contract.
(f)	"Owner"	The public body or authority for whom the work is to be performed and as identified in the advertisement and proposal.
(g)	"Engineer"	The Director of Public Works and Engineering for the Meridian Township or their authorized representative.

GENERAL SPECIFICATIONS

INDEX

GS.1 DEFINITION

The Contractor shall furnish all materials specified herein, shown on the plans, and required to be incorporated in the work of the Contract. They shall furnish all labor, construction equipment, tools, supplies and facilities required to construct the elements designated by the Contract documents and shall construct all of the designated elements complete and in full conformance with the requirements of these documents. They shall comply with all regulatory provisions of the Contract, General Conditions and the Specifications.

GS.2 ELEVATIONS

All the elevations shown on the plans or referred to herein are in feet above mean sea level datum as established by the United States Geological Survey, unless otherwise noted. The Contractor shall verify all the existing structure locations and elevations at points of connection or possible interference between their work and the existing structures and shall report at once to the Engineer any interference's or discrepancies discovered.

GS.3 QUALITY OF MATERIALS AND EQUIPMENT FURNISHED

All materials and equipment furnished by the Contractor hereunder shall be new and conform to specifications herein.

Materials, supplies, and equipment, whether furnished by the Contractor or the Owner, shall be stored at the site of the work in such manner as not to interfere with traffic, convenience to public or other Contractors on the site or in the vicinity. The Contractor shall be responsible for any damage caused to new or existing structures by reason of such storage or handling of materials, supplies, or equipment.

Flammable materials in portable containers are not to be stored overnight on the site. This includes, but is not limited to, gasoline and diesel fuel for use in construction machinery. Portable containers suitably protected, will be allowed overnight at the site, if confined to permanent tanks which are a normal part of the construction machinery.

GS.3 QUALITY OF MATERIALS AND EQUIPMENT FURNISHED (Cont'd.)

Where the Contractor is required to do work within rights of way under the jurisdiction of governmental bodies, they shall meet the requirements of said governmental bodies for work and storage within their jurisdiction. Such requirements must be met as a minimum requirement, and if the specifications given herein impose further limitation on the work, they shall also be met as the required work standard.

The Contractor's attention is directed to the Ingham County Road Department permit specifications, Section 5. Restoration and Maintenance of Right-Of-Way (e.), for dust control requirements.

GS.4 CARE OF EXISTING STRUCTURES

The Contractor shall be solely responsible for any damage to any existing underground services or structures, or to structures and roadway above ground caused by their operations or those of their subcontractors and suppliers.

GS.5 CARE OF NEW STRUCTURES

The Contractor shall use every reasonable precaution to prevent injury to the new structures being constructed hereunder. They shall be responsible to correct all injury or damage resulting from their operations and/or occurring while the work is under their supervisory control. They shall furnish and install such guards, coverings and other protection as may be needed to insure that the structures remain undamaged prior to completion of the entire work.

In the event damage does occur to the finished portions of the work, or to the work in progress, the Contractor shall take such corrective action and measures as may be necessary to repair the damage to the satisfaction of the Engineer.

GS.6 EXISTING PUBLIC UTILITIES

Existing public utilities and underground structures such as pipelines, electric conduits and sewers are shown on the drawings from available information. The Contractor shall, through Miss Dig and any other reasonable measures, verify the exact location of underground utilities for themselves.

The Contractor shall conduct their operations so as not to damage any existing utility whether or not shown on the plans. The Contractor shall correct, at their own expense, any damage or injury that may be caused by them during their operations or damage or injury caused during the operations of their subcontractors or suppliers.

The Contractor shall be responsible for coordinating relocation or repair of existing public and private utilities with the appropriate utility or owner. No extra payment will be allowed for repairs.

If the Contractor desires, or is required by the utility companies, to relocate any power or telephone poles to facilitate their work, any expense encountered from such relocation shall be borne by the Contractor.

GS.7 PROTECTION OF TREES AND SHRUBS

All trees and shrubs encountered along the route of the project shall be protected from damage by the Contractor and saved from harm resulting from any of their operations or operations of their subcontractors and suppliers. Only those trees and shrubs marked for removal on the plans shall be removed. All others will be saved from damage by tunneling or by slightly adjusting the alignment of the project as directed by the Engineer.

GS.8 SAFETY PRECAUTIONS

During the progress of the work, the Contractor shall maintain adequate facilities for the protection and safety of all persons and property. The Contractor and all their subcontractors and suppliers shall comply with the "Construction Safety and Health Standards" as published by the Michigan Occupational Safety and Health Administration, and to all other local, state and federal laws, ordinances, rules and regulations pertaining to safety of persons or property.

GS.9 SANITARY REQUIREMENTS

The Contractor shall provide adequate sanitary facilities for all persons employed on this Project. The sanitary facilities shall conform in every way to the requirements of the "Construction Health and Safety Standards" as published by the Construction Safety Standards Commission of the State of Michigan.

GS.10 UTILITIES

The Contractor shall make all necessary arrangements for the provision of all utility services required to prosecute the work under this Contract. The Contractor shall pay the costs for such connections and service. Where the Owner has utility service at the site, the Contractor may obtain service by connection to the Owner's service, subject to reasonable regulation of its use and satisfactory agreement as to charges. In the event that the Contractor's use of any or all of the Owner's utility services causes the Owner to have an inadequate supply of such service, the Contractor shall disconnect said service and provide their own separate supply at no cost to the Owner.

All utility services shall be inspected by and meet the requirements of the applicable local codes and governmental bodies.

GS.11 PUMPING AND DRAINAGE

Adequate pumping and drainage facilities shall be provided and water from whatever sources entering the work during any stage of construction shall be removed promptly and disposed of. All pumping and drainage shall be done with no damage to property or structures and without interference with the right of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Dewatering shall be done in such a manner that the soil under or adjacent to existing structures shall not be disturbed, removed or displaced.

The overloading or obstructing of existing drainage facilities shall not be permitted, and the Contractor shall be solely responsible for damages caused to such existing drainage facilities by their operations. Additionally, sufficient measures shall be utilized to prevent migration of soil from the site due to any pumping or drainage activities.

GS.12 WINTER CONSTRUCTION

The Engineer has authority over approving the prosecution of work which is proposed to be done during the winter months. The Contractor shall provide adequate weather protection, temporary heating and take any other measures which are necessary to ensure that work performed during the winter months is properly installed and protected against damage from freezing.

Reference is made in Division 4 of the Technical Specifications to the requirements for performing concrete construction and masonry construction in cold weather.

GS.13 USE OF FACILITIES BEFORE FINAL COMPLETION

The Owner shall have the right to make use of, during construction, such portions of completed and acceptably tested facilities as it finds practicable. Such use by the Owner shall not relieve the Contractor from responsibility for any defective work which may be subsequently discovered.

GS.14 TEST OF MATERIALS

All laboratory tests, except as otherwise noted, are to be made at the expense of the Contractor as specified in the Technical Specifications. The Contractor shall furnish satisfactory containers for taking and shipping samples. The name of the laboratory making the test must be submitted by the Contractor to the Engineer for approval.

In all cases "laboratory" refers to an independent laboratory of recognized standing. Acceptance of materials tested shall be based upon compliance with the specifications hereinafter stated for the various items. Where no particular tests are specified, the tests shall be those normally made for determination of the fitness of the particular material. Certificates of tests shall be furnished by the testing laboratory or producer, in triplicate, to the Engineer.

The Owner may require, at its own option and expense, additional mill and/or shop inspection by competent parties. The Owner may require, at its own option and expense, additional field inspection by a qualified inspector.

All materials failing to meet the requirements of the specifications, as determined by test or otherwise, shall be rejected and not used in the work. The cost of testing materials which fail to meet requirements shall be paid by the Contractor. All follow-up testing required shall also be paid by the Contractor. Materials, if rejected at the site, shall be immediately removed therefrom and shall not be used in the work.

GS.15 OTHER WORK

The Contractor shall cooperate with other Contractors on the site or adjoining work to the end that the entire Project may proceed with the utmost harmony and with a minimum of delay.

Where the work under this Contract is to involve work completed under other contracts or existing facilities or structures, the Contractor shall investigate the condition of such other work or facility to determine its suitability for incorporation into the work of this Contract. Any defect or discrepancy in other work of facility making it unsuitable for proper execution of this Contract shall be immediately reported to the Owner who shall order such adjustments in the work of the project as necessary for proper completion, and unless such defect or discrepancy is reported promptly, the Contractor shall be solely responsible for any adjustments in the work as shall be found necessary to properly complete the work on this project.

GS.16 LINES AND GRADES

General control lines and grades will be established by the Owner. The Contractor shall notify the Engineer no less than 48 hours prior to requiring such control. The Contractor shall furnish all stakes and labor for driving them and rodmen to assist the Owner in this work. The Contractor shall carefully preserve the general control lines and grades established by the Engineer. The cost of replacement of stakes which are damaged or lost shall be borne by the Contractor.

Construction lines and grade shall be transferred and set by the Contractor from the control lines and grades established by the Engineer, and the Contractor shall furnish necessary instruments and competent personnel for performing such work, and they shall be responsible for the accuracy of the transferred line and grade. The Owner will check the work at intervals, as it deems necessary, and the Contractor shall make correction of error, if any, at their own expense, as may be required for the proper function and performance of the structure and installed equipment.

GS.17 COMPLETE WORK REQUIRED

It is the intent of the Contract documents to provide that the Project to be constructed under this Contract will be complete and ready for use. Any minor items not specifically called for on the plans or specifications, but which are clearly necessary, are to be included.

GS.18 PROPERTY MARKERS

The Contractor shall take precautions not to move or destroy any monuments or stakes marking the boundaries of property along or near the work. A licensed surveyor shall reestablish property irons in the proper location if disturbed. Buried property irons shall be extended 1/2" diameter rods. The Contractor shall pay for reestablishment.

GS.19 RECORDS AND MEASUREMENTS

The Contractor shall keep careful records showing measured overall length of underground facilities installed and distances of such from any available line as may be designated by the Engineer. Such records shall be turned over to the Engineer as the work progresses and the records must be accurate and complete.

GS.20 GUARANTEE

The Contractor shall guarantee and shall secure from the manufacturer of each item of manufactured equipment used in the project a written guarantee that all materials and equipment furnished by them shall be first class and free from defects, and the guarantor agrees that they will, upon notice and without delay, make good or repair without expense to the Owner the whole or any part of the equipment furnished by them hereunder, which within a year from date of acceptance of that portion of completed work incorporating such equipment shall fail or develop unfitness for the purpose for which it is intended as a result of any defect in design, material, workmanship, erection or construction.

MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 1

EARTHWORK

INDEX

1.01 SCOPE

The Contractor shall furnish all labor, materials, tools and equipment for all excavation and backfilling required for work under this contract, including all sheeting, shoring and bracing, dewatering of excavation, and other work as herein specified. All work shall be done in accordance with the current Michigan Department of Transportation Standard Specifications for Construction, except as stated within this specification.

1.02 CONSTRUCTION METHODS

1. Clearing the Site

The Contractor shall clear the site of all brush and debris which may be present and interfering with construction operations and shall remove and dispose of the same. No trees or shrubs are to be removed unless shown on the plans or permitted by the Engineer. Concrete, asphalt, trees, and shrubs shown on the plans to be removed shall be disposed of at a suitable location off the site of the work.

2. Protection of Trees

All trees which are to be preserved or which, in the opinion of the Engineer, might be subject to damage by the Contractor's operations, shall be adequately protected against damage to the bark by 2-inch thick vertical planking securely wired or tied completely around the tree trunk. Such protection shall not be removed until authorized by the Engineer.

No excavation greater than 1 foot in depth shall be made by machine within 5 feet of any tree. If the excavation cuts within the canopy (dripline) of a tree, the Contractor shall tunnel under roots and protect them from injury throughout the work. All roots greater than 2" shall be cleanly cut, if removed.

Trees which interfere with the work, and the removal of which is permitted, shall be removed by the Contractor in a safe manner and incidental to construction unless otherwise noted on plans and proposal. No trees are to be removed without the expressed approval of the governmental body or property owner having jurisdiction thereof, and of the Engineer.

Trees, trunks, and limbs to be removed that are greater than six inches in diameter shall be trimmed and cut into lengths less than eight feet and piled outside of the right of way for use if the abutting property owner so desires. If the property owner does not desire the timber, the timber becomes the property of the Contractor. All other timber, brush, limbs, and stumps shall be disposed of by the Contractor. Onsite burning will not be allowed.

1.02 CONSTRUCTION METHODS (Cont'd.)

3. Erosion Control

Erosion Control devices shall be installed as shown on the plans and as needed to eliminate the migration of soil from the worksite. Typical devices include catch basin fabric drops (silt sacks) and silt fence. Additional requirements, as necessary, can be found in the Special Provisions.

Fabric drops shall be designed and constructed for use in the specified structure. Drops shall be installed prior to construction, cleaned and maintained in a working state for the duration of the project, and removed and disposed of upon final completion and restoration of the construction site.

Silt fence shall be a product in accordance with the MDOT 2012 SSC, Section 910.

Grass shall be growing before the erosion control measures are removed. Retainage will not be released until the sediment guards are removed.

4. Excavation

A. General

Trench excavation shall be by open cut, except as otherwise shown or permitted. Excavation may be performed by any practical method consistent with the integrity and protection of the work, adjoining structures, and the protection of workers and the public.

Excavation of trenches for piping shall provide a minimum net clearance of six inches outside the barrel of the pipe and, in all cases, shall be of sufficient width to permit the convenient placing of pipe and making of joints. The bottom of the trench shall be shaped so as to conform as nearly as possible to the outside of the pipe, particular care being taken to recess the bottom of the trench in such a manner as to relieve the bell of all load and to provide continuous soil bedding under the lower quadrant of the pipe.

Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for practical construction methods to be followed.

If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be refilled with selected material. It shall be thoroughly tamped into place in not more than six inch layers, to the satisfaction of the Engineer, before the construction work proceeds. Alternatively it may be filled with Class B Concrete or Flowable Fill.

Foreign materials such as slabs of wood, boulders, etc. which obstruct the excavation, shall be removed with other excavation; and where such obstructions occur at or near the bottom, requiring excavation below grade for their removal, the excavated area shall be brought back to grade as in the previous paragraph, and incidental to construction. Unnecessary excavation below grade by the Contractor shall be refilled to grade as in previous paragraph, and at the Contractor's expense.

B. Existing Utilities and Structures

The Contractor shall cooperate with all utility firms, in advance, to locate and avoid interference with and damage to existing facilities, insofar as possible. Means for elimination of interference and correction of damage shall be subject to the instruction or approval of the Engineer. Where any apparent conflicts with underground utilities become evident, the Contractor shall excavate the utility in advance of working in the area. The Engineer shall then determine if any conflict exists and, if so, shall determine the action to be taken. Exploration for underground utilities is incidental to the other work performed.

Underground pipes or structures encountered in excavation shall be adequately supported during the Contractor's operations. Before backfilling, the structure shall receive a permanent support of a suitable material approved by the Engineer, extending from the bottom of the excavation to the underside of the pipe or other structure.

1.02 CONSTRUCTION METHODS

4. Excavation

B. Existing Utilities and Structures (Cont'd.)

The Contractor shall use care not to damage adjoining structures and existing underground utilities. Existing underground pipes and cables are shown on the plans insofar as information is reasonably available. The Contractor shall be responsible to ascertain the locations of all utilities, whether shown on the plans or not.

Work within MDOT and Ingham County Road Department (ICRD) rights of way is done under separate permit from the agency involved. In addition, to these specifications, the Contractor shall adhere to all conditions contained in such permits.

When excavating along paved roads, extreme care shall be taken that the existing pavement and structures will not be damaged or undermined. All sheeting, bracing, and other equipment necessary to prevent damage shall be furnished by the Contractor. Where a trench must be cut through a roadway or driveway, particular care shall be taken not to unnecessarily damage adjoining areas of pavement. Existing pavement shall be sawcut prior to excavation.

Sheeting or other suitable protection, as required, shall be provided wherever excavation is performed adjacent to an existing structure. Any material removed from beneath the foundation of an existing structure shall be replaced with Class B concrete. Sheeting, bracing, and shoring required to support the sides of excavation shall be removed with care after completion of the work. Any injury to the work or to adjacent property resulting from the removal shall be repaired by the Contractor.

The Contractor shall be responsible for any damage caused by their operations to pipes, structures, poles and accessories, and the like above or below ground, whether shown on the plans or not. They shall make good and repair any such damage to the satisfaction of the Engineer. Particular care shall be exercised where excavation or other work is being prosecuted near electric or telephone lines.

C. Ground Water

Excavations shall be kept dry during placing of pipe and initial backfill. The Contractor shall supply stone sumps and pumps as necessary to maintain satisfactory conditions. This work is considered incidental to the pipe cost.

The Contractor shall take all necessary precautions to prevent the accumulation of water to such a level as might cause damaging uplift pressure to partially completed structures. The Contractor shall be responsible for any damage to partially completed structures because of inadequate or improper protection from uplift pressure, and shall repair or remove and replace at their own expense, to the satisfaction of the Engineer, all work so damaged.

D. Dewatering

The Engineer may direct the installation of a dewatering system if they deem it necessary to lower the adjacent water table. This is a pay item which includes all costs to furnish and operate the system, including down-time and remobilization. Only use this method when normal methods, outlined in above paragraph (4C), prove to be insufficient.

5. Backfilling and Rough Grading

A. Bedding and Initial Backfill

The backfilling and bedding of utilities shall not incorporate frozen materials. Trench backfill shall be carefully placed such that pipeline and grade are not disturbed. Bedding and initial backfill shall be as specified for ductile iron, plastic, and concrete pipe in Division 2 and for ductile iron pipe in Division 3 of the Technical Specifications.

1.02 CONSTRUCTION METHODS

5. Backfilling and Rough Grading (Cont'd.)

B. Final Backfill Outside Right of Way

The remainder of the trench, if not in a roadway, may be backfilled with excavated material unless it contains peat, muck, cinders, stones larger than 6" in diameter, or other undesirable material as determined by the Engineer. This undesirable material shall, upon written order of the Engineer, be removed and replaced with Extra Sand Backfill or material approved by the Engineer.

In a field, above a point 12-inches over the pipe, water main trenches may be backfilled completely with loose material and compacted from the top of the trench. Sewer trenches shall be backfilled and compacted in layers of 3'. In lawn areas the layers in each case shall not exceed 12".

Excavated material, above a point 12-inches over the top of the pipe, shall be compacted by running the wheel or track of excavation equipment along the trench or by methods and equipment approved by the Engineer. At least 30" cover over the top of pipe is required for wheeled or tracked vehicles and 48" cover for machine mounted compactors. Temporary mounding of excess material over the trench will be allowed only until such time as lawn repairs are completed.

C. Backfill within Roadway Zone of Influence

Where excavation cuts through a road, drive, or sidewalk, or is in the zone of influence of a pavement, the trench shall be backfilled with granular material and compacted in accordance with MDOT or ICRD specifications, whichever is applicable. Road crossings are incidental to pipe installation. Longitudinal trenches will be paid as the bid item Extra Sand Backfill, unless otherwise specified.

D. Rough Grading

At the end of each working day, all excavations shall be completely backfilled up to existing grade with all excess excavated material being removed from the site. The excavation at the point where pipe installation is to start on the next working day need not be backfilled if it is greater than 6 feet deep, adequately protected, fenced, and lighted. However, in all cases, roadways and driveways should be made accessible overnight.

Excessive soil settlement and any resulting damage which occurs within one year of final approval shall be repaired by the Contractor at no cost to the owner.

6. Extra Sand Backfill

When the Engineer deems the native backfill material above the pipe to be unsuitable (such as rocks, peat or landfill outside the right of way or clay within the right of way) they may order extra sand backfill.

The unsuitable material shall be removed from the site and replaced with an approved granular material. This granular material shall be compacted as previously specified for excavated material.

Sand used under paved driveways, for road crossings, for pavement sub-base or for pipe bedding and backfill to a point 12" over the pipe is considered incidental to the project and does not qualify as Extra Sand Backfill, unless it is the result of a plan change.

7. Extra Stone Bedding

This item is used, as directed by the Engineer, to replace any unsuitable earth foundation, (such as muck, landfill or rubble), below the pipe bedding or trench bottom. The unsuitable material shall be removed from the site and replaced with one-inch crushed stone.

Stone used for dewatering purposes and for pipe bedding and backfill is considered incidental to the project and does not qualify as Extra Stone Bedding.

1.02 CONSTRUCTION METHODS (Cont'd.)

8. Restoration & Clean-Up

As construction operations proceed, the Contractor shall follow their operations with a general clean-up which shall include rough grading, removal of debris, temporary replacement of mailboxes, temporary restoration of driveways, etc. The general clean-up shall follow construction such that no more than 1000 feet shall remain uncompleted at any time. Access to individual homes and parcels shall remain uninterrupted during construction operations with all driveways temporarily restored to use at the end of each working day. Temporary driveways and roads shall be maintained by the Contractor during the period of construction.

After all construction has been completed, the Contractor shall finish, grade and rake all areas disturbed by construction. Topsoil shall then be spread on the prepared areas to a depth of 3-inches. All stones and lumps larger than 1-inch diameter plus all roots, litter and other foreign material shall be raked out prior to seeding or sodding.

Lawn areas and vacant land shall be repaired with seeding, fertilizer and mulch. 12-12-12 fertilizer shall be evenly applied at a rate of 200 lbs./acre. Seed shall be MDOT "THM" mixture and shall be sown following or in conjunction with the fertilizer and while topsoil is in a friable condition. Seed shall be evenly sown at a rate of 220 pounds per acre and shall not be sown through mulch. Mulch blankets shall be installed immediately after seeding and shall be pinned in place, unless otherwise specified.

If called for, lawn areas shall be repaired with first-quality commercial lawn sod. The existing sod in the excavated areas shall be cut, trimmed and removed as necessary to accept a minimum 12-inch width of new sod without overlapping new sod onto the existing or without leaving gaps between the new sod and existing. Watering of new sod shall be the responsibility of individual property owners.

Driveways and approaches shall be repaired with material of the same quality, width and thickness as that which existed prior to construction, but shall not be less than the following:

i. Concrete shall be 6-sack, transit-mixed; formed, jointed and finished to match existing. Slabs less than 24-inches wide shall be removed and replaced with new concrete – see Division 4 of the Technical Specifications for additional requirements.

ii. Asphalt shall be MDOT HMA 13A, three inches compacted thickness and rolled to a uniform, dense surface. Prior to placing of new asphalt, the existing asphalt shall be trimmed with a concrete saw to straight edges which are parallel with the adjoining roadway. Overlays shall be preceded by an asphalt primer. Thicknesses greater than two inches shall be placed in two layers that have cooled between courses.

It is the intent that upon completion of the work all surfaces will be returned to the standard of profile and conditions that existed prior to this work. All gravel, top soil, seeding, sodding, surface restoration, paving, etc., shall be performed under this contract. Surface restoration shall include replacement of mailboxes, posts, fences, signs, culverts, ditches and other miscellaneous improvements. No deviations from existing conditions will be allowed without the written permission of both the Engineer and the affected property owner.

MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 4

CONCRETE WORK

INDEX

4.01 SCOPE

This work shall consist of furnishing all labor, materials and equipment necessary for the proper mixture and placement of concrete. The current MDOT Standard Specifications for Construction (SSC) shall be followed, unless otherwise specified.

4.02 MATERIALS

1. Supplier

The use of transit-mix concrete is required. The Contractor shall notify the Engineer who the supplier will be prior to beginning work. The Engineer must approve the concrete supplier and the mixer trucks used to transport the concrete.

2. Concrete Mixture

Batching and mixing operations shall conform to ASTM C94. Water shall not be added to the mix after the trucks leave the batching plant. The mix for sidewalk shall be MDOT P1 with approximated proportions of one part cement; two parts fine aggregate, and three parts coarse aggregate. The mix shall contain 6 sacks of cement per cubic yard, with a maximum allowable slump of 3½" (three and one-half inches).

Coarse aggregate shall conform to MDOT 6AA. Fine aggregate shall conform to MDOT 2NS. Cement shall be Type 1A air-entraining Portland cement conforming to ASTM Specification C150 or Type 1 with an air entrainment admixture. Air shall be 6% plus or minus 1%.

The compressive strength of Class A concrete shall not be less than 3,500 pounds per square inch (psi) after 28 days. The compressive strength of Class B concrete shall not be less than 3,000 psi after 28 days.

4.02 MATERIALS

2. Concrete Mixture (Cont'd.)

Water shall be clean and free from deleterious substances such as oil, alkali and organic matter. Potable water shall be used from sources approved by the Engineer.

No admixtures will be used unless approval is received from the Engineer, or is specified. Admixtures, if approved, shall be used in strict accordance with manufacturer's directions and shall conform with applicable ASTM Standards.

3. Reinforcing

Concrete slabs, walls and footings shall be reinforced with steel bars or mesh as shown on the plans. Bars shall be rust-free, new deformed billet-steel conforming to ASTM A615, Grade 60 and mesh shall conform to ASTM A1064.

The Contractor shall prepare and submit to the Engineer shop drawings showing bending and assembly diagrams, splicing, laps of bars, shapes, dimensions and details of bars. Scaled dimensions from drawings shall not be used in determining the lengths of reinforcing bars.

4.03 CONSTRUCTION METHODS

1. Subgrade Preparation

The earthgrade shall be prepared by removing the topsoil, vegetative cover and root mat. The base shall then be prepared by excavating and/or placing of embankment material to achieve the grade and cross-section required. All soft and yielding material shall be removed and replaced with acceptable material.

When a pathway is benched into cut or fill slopes, grading shall be done in accordance with the MDOT SSC, Section 205, Roadway Earthworks. Subgrade density shall be not less that 95% of Maximum Unit Weight in fills. In cuts, the Engineer will visually inspect the grade and may order additional compaction to achieve the desired subgrade density.

A minimum of three (3) inches of Class II granular material shall be used under all pathway construction. The base shall be smoothed, trimmed and compacted prior to placement of forms. The Engineer may order additional compaction to achieve the desired subgrade density after visual inspection.

2. Formwork

All concrete work shall be accurately formed to the lines and grade shown on the plans. Forms shall extend to the full depth and width of the specified concrete surface. Forms shall be shored and braced from the outside to maintain ¼" tolerance in thickness, line and grade. All formwork shall be oiled with an approved non-staining form oil before placing concrete. Formwork shall be left in place until the concrete is sufficiently hard so as to not be damaged upon removal.

Construct all formwork to provide continuous, straight, smooth surfaces and edges. Exposed edges to have ½" chamfer. Curved walks shall be formed on a radius with flexible forms.

4.03 CONSTRUCTION METHODS (Cont'd.)

3. Placement

All formwork and reinforcement placement shall be inspected by the Engineer prior to placement of concrete. The Contractor shall give ample notice and time so that such inspection can be made.

No concrete shall be deposited until the area has been dewatered and not until after the Contractor has made satisfactory provisions to eliminate all possibility of water entering or flowing through the concrete while it is being poured or is curing.

Subgrades shall be wetted and forms shall be oiled prior to concrete placement. All debris shall be removed from forms and reinforcement.

Time Between Charging Mixer and Placing Concrete (minutes)			
Type of Unit	**Concrete Temperature (ASTM C1064)**		
	<60°F	**60°F – 85°F**	**>85°F**
Truck Mixers	90	60	45
Truck Mixers with Concrete containing Water-Reducing Retarding Admixture	120	90	70

Exposed concrete shall not be poured when the atmospheric temperature is below 40°F or when the concrete temperature is below 55°F as placed. Concrete shall not be poured on frozen ground. Concrete shall not be cast if the temperature of the concrete is above 90°F.

Tickets shall be prepared in accordance with the MDOT SSC, Section 1001, Concrete Production Equipment and Facilities.

When placement of concrete is started, it shall be carried on as a continuous operation until the placement of the section is completed. Concrete in walls shall be placed in 24-inch lifts keeping surface of concrete level throughout. Concrete shall be deposited to the full depth of the forms in one pour. Drops of greater than 5' shall use tubes.

Reinforced concrete greater than six inches in finished thickness shall be compacted by high frequency internal vibrators. The concrete shall be thoroughly worked around the reinforcement and into the corners of the forms, using procedures which minimize air pockets and honeycombs. Care shall be taken in vibrating concrete so as not to move reinforcement out of place.

Concrete less than six inches in finished depth shall be compacted by spading along all edges and joints and by alternately tamping and striking off the surface until all voids are removed.

4. Finishing

Horizontal, exposed surfaces shall be floated and troweled just enough to produce a smooth, dense surface, free from irregularities. All joints and edges shall be rounded to a radius of one-quarter inch by the use of an approved edging tool. After completion of floating and finishing, a fine brush shall be drawn across the finished surface to remove tool marks, and provide a non-slip surface.

4.03 CONSTRUCTION METHODS

4. Finishing (Cont'd.)

Formwork panels are intended to provide a satisfactory finish for vertical, exposed surfaces. Finishing shall be limited to minor rubbing, removal of fins and patching of honeycombed areas. Unexposed surfaces need not be finished except for patching of honeycombed areas.

All concrete sidewalk and driveway approaches shall be legibly stamped with the name of the Contractor and the year, with figures 1½" to 2½" tall. The stamps shall be used at the ends of each segment, each truck load, and at intervals no greater than 100 feet in length.

5. Joints

1. Construction cold joints not indicated on the plans shall be so made and located so as to least impair the strength of the structure. The location of all construction joints shall be approved by the Engineer. Slabs shall have a cold joint at the end of each truck load.

2. Transverse expansion joints ½" thick shall be placed in sidewalk at approximately 100 foot intervals. ½" thick expansion joints shall be placed anywhere that the walk meets the back of curb, and where the walk meets the edge of concrete driveways or building walls.

   Expansion joints material shall be pre-molded of bitumen filled fiber placed at right angles to the line of the walk, perpendicular to the surface and shall extend from ¼" below the surface of the walk to the subgrade.

3. Contraction (plane of weakness) joints shall be placed at a minimum distance equal to the width of the sidewalk. Contraction joints for bicycle pathways (7-foot width) shall be spaced approximately nine feet apart. The joint shall be sawed to a width of $^{1}/_{8}$" and to a depth of ¼ of the slab thickness.

   Sawing must be accomplished as soon as the concrete has hardened such that no excess raveling or spalling occurs, but before any random cracks develop. Joints shall be at right angles to the line of the walk, and perpendicular to its surface. Tooled joints are not allowed.

6. Curing and Protection

Sidewalks and other slabs on grade shall be treated with a curing compound conforming to the requirements of ASTM C309. The compound shall be sprayed or rolled on to provide a continuous film over the entire surface of the walk after completion of finishing, and as soon as all free water has left the surface. Compound shall be applied at the rate of not less than one gallon per 200 square feet. Immediately upon removing sidewalk forms, the exposed concrete edge shall be sprayed with curing compounds or backfilled with earth. The final grading of topsoil will be such that the mature sod will be ½" below the concrete.

All concrete shall be protected from vehicles for the first 72 hours after placing. The period of protection will increase to 7 days as the temperature decreases to 40°F. Any concrete found to be defective or damaged due to weather, vandalism, or other causes shall be removed and replaced, at the Contractor's expense. Damaged sections of sidewalk and curb and gutter shall be removed back to the nearest joint or as indicated by the Engineer.

Freshly placed concrete shall be protected from rain by covering with polyethylene film.

4.03 CONSTRUCTION METHODS

6. Curing and Protection (Cont'd.)

Concrete shall not be allowed to freeze for 72 hours. Protection must be provided when there is a forecast for freezing.

Barricades shall be placed at the areas under repair from the time the damaged section is removed until it is ready for use. Lighted barricades will be required for intersection areas left under repair overnight.

4.04 TESTING

The Contractor shall make arrangements for and coordinate various concrete tests as ordered by the Engineer. The testing company will be selected by the Township and the Township will pay for the tests. The Contractor will be charged for any waiting time suffered by the testing company. All tests will be done according to ASTM standards.

2023 PUBLIC SAFETY BUILDING STANDBY GENERATOR CONTRACT

SPECIAL PROVISIONS

These Special Provisions are in addition to those in the General and Technical Specifications, and supersede the General and Technical Specifications in the event of a conflict.

GENERAL

TESTING – The Contractor will be responsible for scheduling concrete and compaction testing. Testing will be done by Soil and Materials Engineers, Inc. (SME), 517.887.9181. The cost will be paid by Meridian Township, except for any wait time.

PROPERTY IRONS – A licensed surveyor shall reestablish property irons in the proper location, if disturbed. Buried property irons shall be extended using ½″ diameter rods. The Contractor shall pay for reestablishment.

ROAD RIGHT-OF-WAY – All work in the public right-of-way is done under permit and approval of the Ingham County Road Department (ICRD) and MDOT, as appropriate. The Contractor shall secure the ICRD right-of-way permit(s). The Township will obtain any necessary MDOT permit(s).

SITE CLEANUP – At the end of each day the work site shall be rough graded. In the event that it is necessary to leave a point of excavation open overnight, the area shall be safely barricaded. At the end of each week, or as deemed necessary by the Township, the street surface shall be wetted and swept clean of all construction debris.

TRAFFIC CONTROL – Place reflective cones or barrels around any equipment or materials left in the roadway or on the sidewalk. This traffic control is incidental.

PAY ITEMS

1. **STANDBY GENERATOR** – This pay item includes all labor, equipment, and material necessary to install a new standby generator, provided by the Owner, as shown on the plan (Appendix C). The new standby generator is located at the Meridian Township Service Center at 2100 Gaylord C. Smith Ct., Haslett, MI 48840. The Contractor shall transport the generator to the site for installation.

2. **AUTOMATIC TRANSFER SWITCH** – This pay item includes all labor, equipment, and material necessary to install a new 400A automatic transfer switch (ATS), provided by the Owner, in the Public Safety Building electrical room (Appendix B) and described herein. Locate and mount the new ATS in coordination with the Engineer. Any concrete coring necessary to mount the new ATS and run associated conduit is included in this pay item. The new ATS is located at the Meridian Township Service Center at 2100 Gaylord C. Smith Ct., Haslett, MI 48840. The Contractor shall transport the ATS to the site for installation.

3. **STANDBY GENERATOR CONCRETE PAD** – This pay item includes all labor, equipment, and material necessary to install a concrete foundation pad as shown on the plan (Appendix C).

4. **GENERATOR, REMOVAL** – This pay item includes all labor, equipment, and material necessary to safely remove and properly dispose of an existing standby generator, concrete pad, and associated gas service and electrical connections. The gas service shall be abandoned in accordance with the requirements of CMS Energy. The electrical connections between the generator and the building shall be severed and the lines abandoned in place.

5. **UTILITY WORK** – This pay item includes all labor, equipment, and material necessary to complete all of the natural gas and electrical connections related to the standby generator and ATS installation. See the contract Appendices for the current and proposed layout and details. Install a sign adjacent to the electrical meter stating "SECONDARY POWER GENERATION ONSITE". All conduit shall be PVC coated rigid steel, in accordance with ANSI C80.1. Any flexible conduit shall be flexible steel conduit with PVC jacket.

6. **200A PANEL & SWITCH** – This pay item includes all labor, equipment, and material necessary to procure and install a new 200A 60 circuit panel (120/208VAC) and associated 200A switch, to replace the two existing 100A panels and switches in the electrical room (see Appendix B). Up to 60 circuits may need to be combined into the new panel. Coordination with the Owner will be required to determine exactly which circuits need to be relocated – some circuits may remain in the existing right panel.

7. **SITE RESTORATION** – This pay item includes all labor, equipment, and material necessary to restore disturbed grass areas in accordance with the MDOT 2020 Standard Specifications for Construction (SSC), Section 816, and as described herein. The disturbed areas shall be restored to grade with three (3) inches of screened topsoil and hydroseeding. Use seed mix THM, or equivalent residential mix.

Half of the restoration item will be paid once all of the topsoil and hydroseeding has been completed. The remaining half will be paid once sufficient grass growth has occurred to prevent erosion of the topsoil.

Around the perimeter of the new concrete pad, bring the restored surface up to match the top of concrete in order to eliminate any tripping hazard.

8, 9. **ALLOWANCES –** These pay items provide reimbursement for the direct costs associated with installing a new gas service, relocating or re-working the existing electrical service, and for permitting and inspection of the ATS. These items only cover the Contractor's payments to Consumers Energy and the Meridian Township Building Department. Any indirect costs, including, but not limited to, the Contractor's time and travel expenses, are incidental to the contract and not eligible for reimbursement.

Installation of the new gas service and any necessary relocation or re-working of the existing electrical service shall be coordinated directly with Consumers Energy. The electrical permit and inspection shall be coordinated with the Meridian Township Building Department, 517.853.4500.

The amounts listed in the contract are estimates only. The final reimbursement will be for the actual amounts paid to Consumers and Meridian Township. Verification of payment is required prior to release of these pay items.

Consumers Energy crews will install the new gas service to the new gas meter. The Contractor shall install the gas service from the back-side of the meter to the new generator. The **Allowance** covers the cost of the work by Consumers; the cost of the Contractor's work is covered under the **Standby Generator** item.

NOTES:

- *All changeovers to the new generator and switches will need to be completed at one time, potentially after hours, to minimize downtime. The Public Safety Building cannot be left without backup power.*
- *The cost of any additional engineering design and/or plan review is the responsibility of the Contractor.*
- *The pay items detailed in this contract are intended to provide for the complete scope of work as depicted on the plans. Any and all work not covered under a specific pay item, but necessary to complete the project, is considered incidental.*

APPENDIX A

RECORD ONLY SUBMITTAL
POWER GENERATION EQUIPMENT

PROJECT NAME: Meridian Township - Public Safety - Sourcewell
PROJECT: 296183

MODEL(s): C100N6
OTEC400

CUSTOMER: Meridian Township
REFERENCE PO #: 55912

SUPPLIER: Cummins Sales and Service

DATE: 2/21/2022

SALES REPRESENTATIVE: Brandon Vanderwest
616-204-4995
brandon.vanderwest@cummins.com

PROJECT MANAGER: Breanna Okopski
248-410-9501
breanna.okopski@cummins.com

Serving Cummins Customers
in the
Northern Region

NOTICE

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED, PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS

For questions or comments regarding this submittal, please contact your Cummins Sales Representative listed on the Cover Page.

To inquire about factory ship dates, arranging delivery and to schedule start-up of your Cummins Power Generation equipment, please contact the Project Manager listed on the Cover Page of this submittal.

**** Start-Ups must be Scheduled 2 Weeks in Advance ****

Table of Contents

Meridian Township - Public Safety - Sourcewell

Submittal Notes

Meridian Township - Public Safety - Sourcewell

- **Warranties**
  - **Standard 2 Yr/1000 Hr**
  - **Power Electronics 2 Yr Comprehensive - G004**
  - Warranty begins 18 months after shipment from the factory or completion of startup, whichever occurs first
- **Start-up**
  - Start-up performed during normal business hours
  - On-Site Load Bank Test
  - On-Site Personnel Training
  - Refer to pre start-up checklist
- **Project Notes**
  - All fuel by others
  - Design and construction of concrete pad by others
  - Shipped loose components installed by others
  - Offloading of equipment by others

BOMS-001

IMPORTANT!

FUEL SUPPLY REQUIREMENTS

Fuel Source: Natural Gas

Fuel Consumption at Full Load: 1290.0 SCFH

Required Operating Fuel Pressure: 6.0 - 13.0 in H_2O

Fuel pressure required at the engine mounted regulator while the generator set is in operation, no load to full load. ***Please Note: The pressure listed is not a static pressure. If the above pressure is not maintained while the generator set is operating up to full load, the system will not function as required and the fuel delivery system will need to be reworked to provide operating pressure as listed.***

Required Fuel Pressure **AND** Volume **MUST** be available under **ALL** operating conditions at the generator set location.

All generator sets must be installed with a flexible fuel line and fuel strainer prior to the engine connection:

Flexible Fuel Line: [ ] included loose accessory
[✓] included engine mounted

Fuel Strainer: [✓] included loose accessory

Section I

Specification sheet

Spark-ignited generator set

45–100 kW Standby

EPA emissions

Description

Cummins® generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby applications.

Features

Gas engine - Rugged 4-cycle Cummins QSJ5.9G spark-ignited engine delivers reliable power. The electronic air/fuel ratio control provides optimum engine performance and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 1.1 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance. The PowerCommand 2.3 control is also optional and is UL 508 Listed and provides AmpSentry™ protection.

Cooling system - Standard cooling package provides reliable running at up to 50 ℃ (122 ℉) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminium material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7 -10. The design has hinged doors to provide easy access for service and maintenance.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Natural gas		Propane		
	Standby		Standby		
Model	**kW**	**kVA**	**kW**	**kVA**	**Data sheets**
C45 N6	45	56	45	56	NAD-6093-EN
C50 N6	50	63	50	63	NAD-6094-EN
C60 N6	60	75	60	75	NAD-6095-EN
C70 N6	70	88	70	88	NAD-6096-EN
C80 N6	80	100	80	100	NAD-6097-EN
C100 N6	100	125	100	125	NAD-6098-EN

Generator set specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.25% @ 60 Hz
Radio frequency emissions compliance	Meets requirements of most industrial and commercial applications

Engine specifications

Design	Naturally aspirated or turbocharged (varies by generator set model)
Bore	102.1 mm (4.02 in.)
Stroke	119.9 mm (4.72 in.)
Displacement	5.9 liters (359 in^3)
Cylinder block	Cast iron, in-line 6 cylinder
Battery capacity	850 amps at ambient temperature of 0 °F to 32 °F (-18 °C to 0 °C)
Battery charging alternator	52 amps
Starting voltage	12 volt, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	50 °C (122 °F) ambient cooling system
Rated speed	1800 rpm

Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 ºC (248 °F) Standby
Exciter type	Torque match (shunt) with PMG as option
Alternator cooling	Direct drive centrifugal blower
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3%

Available voltages

1-phase	3-phase				
• 120/240	• 120/208	• 120/240	• 277/480	• 347/600	• 127/220

Generator set options

Fuel system

- ✔ Single fuel - natural gas ~~or propane vapor, field selectable~~
- • Dual fuel – natural gas and propane vapor auto changeover
- • Low fuel gas pressure warning

Engine

- ✔ Engine air cleaner
- • Shut down – low oil pressure
- ✔ Extension – oil drain
- ✔ Engine oil heater

Alternator

- • 120 °C temperature rise alternator
- ✔ 105 °C temperature rise alternator
- ✔ PMG
- ✔ Alternator heater, 120 V
- • Reconnectable full 1 phase output alternator

Control

- ✔ AC output analog meters
- ✔ Stop switch – emergency
- ✔ Auxiliary output relays (2)
- ✔ Auxiliary configurable signal inputs (8) and relay outputs (8)

Electrical

- ✔ One, ~~two or three~~ circuit breaker configurations
- • 80% rated circuit breakers
- ✔ 100% rated LSI circuit breakers
- ✔ Battery charger

Enclosure

- ✔ Sound Level 1 ~~or Level 2~~ enclosure, ~~sandstone or~~ green color
- • Weather protective enclosure with muffler installed, green color
- • Winter protective enclosure, green color

Cooling system

- ✔ Shutdown – low coolant level
- • Warning – low coolant level
- ✔ Extension – coolant drain
- ✔ Coolant heater options:
  - <4 °C (40 °F) – cold weather
  - ✔ <-17 °C (0 °F) – extreme cold

Exhaust system

- • Exhaust connector NPT
- • Exhaust muffler mounted

Generator set application

- • Base barrier – elevated genset
- • Battery rack, standard battery
- ✔ Battery rack, larger battery
- • Radiator outlet duct adapter

Warranty

- ✔ Base warranty – 2 year/1000 hours, Standby
- • 3 year Standby warranty options
- • 5 year Standby warranty options

Our energy working for you.™

power.cummins.com

Generator set accessories

- ✔ Coolant heaters – 1000 W/1500 W
- ✔ Battery rack, ~~standard~~/larger battery
- Battery heater kit
- ✔ Engine oil heater
- Remote control displays
- ✔ Auxiliary output relays (2)
- ✔ Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- Remote monitoring device – PowerCommand 500/550
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Base barrier – elevated generator set
- Mufflers – industrial, residential or critical
- ✔ Alternator PMG
- ✔ Alternator heater

Control system PowerCommand 1.1

PowerCommand control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 °C to +70 °C
- Bargraph display (optional)

AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown

Alternator data

- Line-to-Line and Line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total kVa

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase Line-to-Line sensing
- Configurable torque matching

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop
- Automatic Transfer Switch (ATS) control
- Generator set exercise, field adjustable

Options

✔Auxiliary output relays (2)

- Remote annunciator with (3) configurable inputs and (4) configurable outputs

✔PMG alternator excitation

- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)

✔Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)

✔Digital governing

✔AC output analog meters (bargraph)

- Color-coded graphical display of:
  - 3-phase AC voltage
  - 3-phase current
  - Frequency
  - kVa

- Remote operator panel
- PowerCommand 2.3 control with AmpSentry protection

Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):

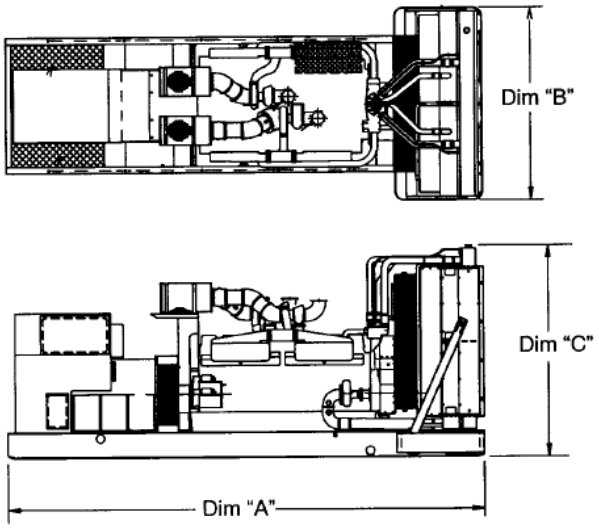
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Refer to drawings for specific weights & dimensions

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set weight*wet kg (lbs.)
		Open set		
C45 N6	2489 (98)	1016 (40)	1473 (58)	989 (2180)
C50 N6	2489 (98)	1016 (40)	1473 (58)	989 (2180)
C60 N6	2489 (98)	1016 (40)	1473 (58)	1103 (2431)
C70 N6	2489 (98)	1016 (40)	1473 (58)	1111 (2449)
C80 N6	2489 (98)	1016 (40)	1473 (58)	1173 (2587)
C100 N6	2489 (98)	1016 (40)	1473 (58)	1233 (2719)
		Weather protective enclosure		
C45 N6	2489 (98)	1016 (40)	1473 (58)	1070 (2359)
C50 N6	2489 (98)	1016 (40)	1473 (58)	1070 (2359)
C60 N6	2489 (98)	1016 (40)	1473 (58)	1184 (2610)
C70 N6	2489 (98)	1016 (40)	1473 (58)	1192 (2628)
C80 N6	2489 (98)	1016 (40)	1473 (58)	1255 (2766)
C100 N6	2489 (98)	1016 (40)	1473 (58)	1315 (2898)
		Sound attenuated enclosure Level 1		
C45 N6	3023 (119)	1016 (40)	1473 (58)	1114 (2455)
C50 N6	3023 (119)	1016 (40)	1473 (58)	1114 (2455)
C60 N6	3023 (119)	1016 (40)	1473 (58)	1227 (2706)
C70 N6	3023 (119)	1016 (40)	1473 (58)	1236 (2724)
C80 N6	3023 (119)	1016 (40)	1473 (58)	1298 (2862)
C100 N6	3023 (119)	1016 (40)	1473 (58)	1358 (2994)
		Sound attenuated enclosure Level 2		
C45 N6	3454 (136)	1016 (40)	1473 (58)	1127 (2485)
C50 N6	3454 (136)	1016 (40)	1473 (58)	1127 (2485)
C60 N6	3454 (136)	1016 (40)	1473 (58)	1241 (2736)
C70 N6	3454 (136)	1016 (40)	1473 (58)	1249 (2754)
C80 N6	3454 (136)	1016 (40)	1473 (58)	1312 (2892)
C100 N6	3454 (136)	1016 (40)	1473 (58)	1372 (3024)
		Winter protective enclosure		
C45 N6	3701 (146)	1016 (40)	1473 (58)	1152 (2535)
C50 N6	3701 (146)	1016 (40)	1473 (58)	1152 (2535)
C60 N6	3701 (146)	1016 (40)	1473 (58)	1266 (2786)
C70 N6	3701 (146)	1016 (40)	1473 (58)	1275 (2804)
C80 N6	3701 (146)	1016 (40)	1473 (58)	1337 (2942)
C100 N6	3701 (146)	1016 (40)	1473 (58)	1397 (3074)

* Weights above are average. Actual weight varies with product configuration.

Refer to drawings for specific weights & dimensions

Codes and standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.		The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
International Building Code	The generator set is certified to International Building Code (IBC) 2012.		All low voltage models are CSA certified to product class 4215-01.
	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.	**U.S. EPA**	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

NAS-6092-EN - 06DEC2019.DOCX (12/19) A054P028

Specification Sheet

PowerCommand® 1.1 Control System

Description

The PowerCommand control system is a microprocessor-based generator set monitoring, metering and control system designed to meet the demands of today's engine driven generator sets. The integration of all control functions into a single control system provides enhanced reliability and performance compared to conventional generator set control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied.

Features

Easy to view: HMI 211RS for residential use. 128 x 64 pixel graphic LED backlight LCD.

Easy to use: Tactile buttons for generator set start/stop. Residential Standby display for convenient use.

Modbus® interface: Eliminates need for MODLON.

Progressive protective functions: Advanced Overcurrent Protection – Generator set monitoring & protection.

Digital voltage regulation: Single phase full wave SCR type regulator compatible with either shunt or PMSG systems.

Digital engine speed governing: Provides isochronous frequency regulation.

12 and 24 VDC battery operation.

Automatic mains failure: Smooth & automatic transfer and re-transfer of load from utility to generator set & vice-versa.

Exerciser clock: Runs generator set exerciser routines for dependability of operation.

Warranty and service: Backed by a comprehensive warranty and worldwide distributor service network.

Certification: Suitable for us on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC Mil Std., CE and CSA standards.

PowerCommand Digital Generator Set Control PCC 1302

Description

The PowerCommand generator set control is suitable for use on a wide range of generator sets in non-paralleling applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC Line-to-Line.

Power for this control system is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 30 VDC.

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation.
- Digital engine speed governing (where applicable) - Provides isochronous frequency regulation.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine Control Module (ECM).
- Common harnessing - with higher feature Cummins controls allows for easy field upgrades.
- Generator set monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system - to sense and warn against a weak battery condition.
- Engine starting - Includes relay drivers for starter, fuel shut off (FSO), glow plug/spark ignition power and switch B+ applications.
- Generator set protection - Protects engine and alternator.
- Advanced serviceability - using InPower™, a PC-based software service tool.
- Environmental protection - The control system is designed for reliable operation in harsh environments. The main control board is a fully encapsulated module that is protected from the elements.
- Exerciser function – Routine exercising of generator set.
- Supports dual fuel control.
- Automatic Mains Failure function built in generator set controller. Modbus interface - for interconnecting to customer equipment.
- Configurable inputs and outputs - Four discrete inputs and two dry contact relay outputs.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

Base Control Functions

HMI capability

Operator adjustments - The HMI includes provisions for many set up and adjustment functions.

Generator set hardware data - Access to the control and software part number, generator set rating in kVA and generator set model number is provided from the HMI or InPower™.

Data logs - Includes engine run time, controller on time, number of start attempts.

Fault history - Provides a record of the most recent fault conditions with control hours time stamp. Up to 10 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase Line-to-Line and Line-to-Neutral)
- Current (single or three phase)
- kVA (three phase and total)
- Frequency
- Engine data
- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Partial Full Authority Engine (FAE) data (where applicable)
- Service adjustments - The HMI includes provisions for adjustment and calibration of generator set control functions. Adjustments are protected by a password. Functions include:
- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable output set up
- Meter calibration
- Units of measurement

Engine control

SAE-J1939 CAN interface to full authority ECMs (where applicable) - Provides data swapping between genset and engine controller for control, metering and diagnostics.

12 VDC/24 VDC battery operations - PowerCommand will operate either on 12 VDC or 24 VDC batteries.

Isochronous governing (where applicable) - Capable of controlling engine speed within +/-0.25% for any steady state load from no load to full load. Frequency drift will not exceed +/-0.5% for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

Temperature dependent governing dynamics (with electronic governing) - Modifies the engine governing control parameters as a function of engine temperature. This allows the engine to be more responsive when warm and more stable when operating at lower temperature levels.

Remote start mode - Accepts a ground signal from remote devices to automatically start the generator set and immediately accelerate to rated speed and voltage. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

Remote and local Emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) Emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either Emergency stop switch will wake up the control.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating. The control can also be configured to go into a low current state while in auto for Prime applications or applications without a battery charger.

Engine starting - The control system supports automatic engine starting. Primary and backup start disconnects are achieved by one of three methods: magnetic pickup, battery charging alternator feedback or main alternator output frequency. The control also supports configurable glow plug control when applicable.

Cycle cranking - Configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shut down after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Alternator control

The control includes an integrated line-to-line sensing voltage regulation system that is compatible with shunt or PMG excitation systems. The voltage regulation system is full wave rectified and has an SCR output for good motor starting capability. Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/-1.5% for a 40 ºC (104 ºF) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level.

The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided. Protective functions include:

Battle short mode

When enabled and the battle short switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a fail to shutdown fault. Emergency stop shutdowns and others that are critical for proper operation are not bypassed. Please refer to the Control Application Guide or Manual for list of these faults.

Configurable alarm and status inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition. The control is programmable for warning, shutdown or status indication and for labelling the input.

Emergency stop

Annunciated whenever either Emergency stop signal is received from external switch.

General engine protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the generator set is signaled to start and indicate a warning if the battery indicates impending failure.

Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Hydro mechanical fuel system engine protection

Overspeed shutdown - Default setting is 115% of nominal.

Low lube oil pressure warning/shutdown - Level is pre-set (configurable with InPower) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High lube oil temperature warning/shutdown - Level is pre-set (configurable with InPower) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

High engine temperature warning/shutdown - Level is pre-set (configurable with InPower) to match the capabilities of the engine used. Control includes time delays to prevent nuisance alarms.

Low coolant temperature warning - Indicates that engine temperature may not be high enough for a 10 second start or proper load acceptance.

Sensor failure indication - Logic is provided on the base control to detect analog sensor or interconnecting wiring failures.

Full authority electronic engine protection

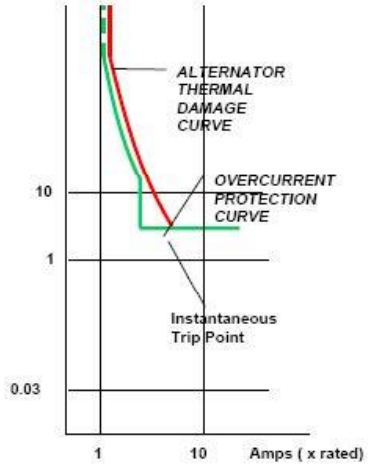
Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI

Alternator protection

High AC voltage shutdown (59) - Output voltage on any phase exceeds pre-set values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-130% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a pre-set value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds.

Overcurrent warning/shutdown - Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.



-

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below nominal governor set point, for a 5-20 second time delay. Default: 6 Hz, 10 seconds.

Over frequency shutdown/warning (81o) - Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz, 10 seconds, enabled.

Loss of sensing voltage shutdown - Shutdown of generator set will occur on loss of voltage sensing inputs to the control.

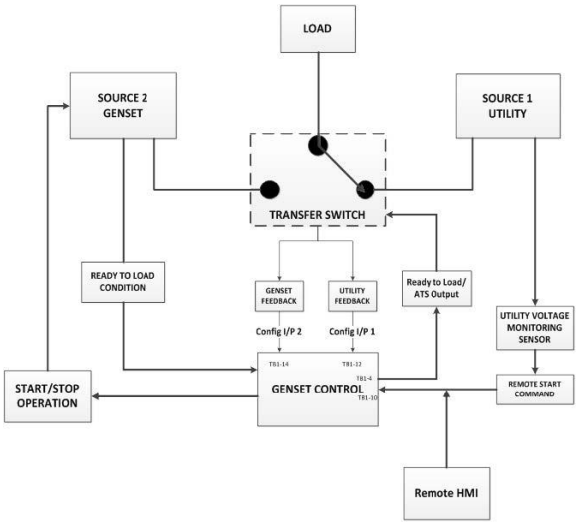
Field overload shutdown - Uses field voltage to shutdown generator set when a field overload condition occurs.

Advanced Functions

Automatic mains failure*

The built in AMF feature provides the automatic transfer and re-transfer of the load from utility to generator set and vice-versa.

- Automatically starts-stops the generator set in the event of utility failure.
- Annunciates faults.



-

* A utility voltage monitoring sensor (as shown in the AMF diagram above) must be connected in order to use the AMF feature on the 1302 control. Use Schneider Electric Relay RSB1A120U7 and Socket RSZE1S35M.

Exerciser clock

The exerciser clock runs the generator set exerciser routines for dependability of operation.

Field Control Interface

Input signals to the base control include:

- Remote start
- Local and Emergency stop
- Configurable inputs: Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed.

Output signals from the PowerCommand control include:

- Configurable relay outputs: Control includes (2) relay output contacts rated at 2 A. These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (generator set running) signal: Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

PowerCommand Human Machine Interface HMI211

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five generator set status LED lamps with both internationally accepted symbols and English text to comply with customer needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

Features

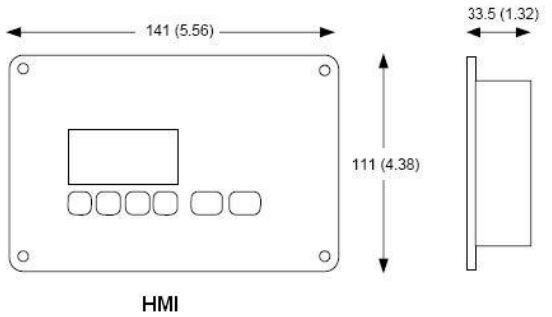
- LED indicating lamps:
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Run
- 128 x 64 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Two tactile feel membrane switches dedicated for off and back.
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.
- HMI 211RS provides convenience for residential use.

Communications Connections

PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.

This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



Dimensions: mm (inches)

Software

InPower (beyond 6.0 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand generator sets and transfer switches, to facilitate service and monitoring of these products.

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC (-40 ºF) to +70º C (158 ºF), and for storage from -55 ºC (-67 ºF) to +80 ºC (176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -40 ºC* (-40 ºF) to +70 ºC (158 ºF), and for storage from -40 ºC* (-40 ºF) to +80 ºC (176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

* Heater accessory (pn: A040H853) is available for enhanced operation below -20 ºC

Certifications

PowerCommand meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4: 1993 compliance, controls and switchgear.
- CE marking: The control system is suitable for use on generator sets to be CE-marked.
- EN 50081-1,2 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std. 202C, Method 101 and ASTM B117: Salt fog test.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance.
- CSA 22.2 No. 14 M91 industrial controls.

Warranty

All components and subsystems are covered by an express limited one year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available

Accessories

1301-1302 Upgrade Kit (HM)	0541-1431
PowerCommand 500 (LAN)	A040X126
Remote HMI 211	0541-1394
Remote HMI 211RS	A046K103
I/O Expansion (Aux 101)	0541-1291
HMI Heater Accessory Kit	A040H853

Parts Ordering Information

1302 Control Board	0327-1617-02
1302 control Board – Arrow	A043W505
Aux 104 (Governor Control)	0327-1507
HMI 211 Without Heater	0300-6014
HMI 211 with Heater	A026G237

Additional Resources

Resource	Where to find
1302 Service Manual	QSOL
Accessories Catalog	cumminspower.com
Additional Controls Information	PowerSuite Library

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

PDS-1566 | PD00000147 | (09/19)

Generator Set Data Sheet

Model:	**C100 N6**
Frequency:	**60 Hz**
Fuel Type:	**Natural Gas/~~Propane~~**
kW Rating:	**100 Natural Gas Standby**
	~~100 Propane Standby~~
Emissions Level:	**EPA Emissions**

Fuel Consumption

	Natural gas Standby				Propane Standby			
	kW (kVA)				kW (kVA)			
Ratings	100 (125)				100 (125)			
Load	**1/4**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**
scfh	538	788	1028	1290	210.2	316.3	418.64	526.6
m^3/hr	15.2	22.3	29.1	36.5	5.95	8.96	11.86	14.91

Engine

	Natural gas Standby rating	Propane Standby rating
Engine model	QSJ5.9G-G3	
Configuration	Cast iron, in line, 6 cylinder	
Aspiration	Turbocharged and after-cooled	
Gross engine power output, kWm (bhp)	121.3 (162.7)	
Bore, mm (in.)	102.1 (4.02)	
Stroke, mm (in.)	119.9 (4.72)	
Rated speed, rpm	1800	
Compression ratio	8.5:1	
Lube oil capacity, L (qt.)	14.2 (15)	
Overspeed limit, rpm	2250	

Fuel Supply Pressure

Minimum operating pressure, kPa (in H_2O)	1.5 (6)
Maximum operating pressure, kPa (in H_2O)	3.2 (13)

Air

	Natural gas Standby rating	Propane Standby rating
Combustion air, m^3/min (scfm)	8.4 (297.8)	8.5 (298.5)
Maximum normal duty air cleaner restriction, kPa (in H_2O)	0.4 (1.5)	0.4 (1.5)
Maximum heavy duty air cleaner restriction, kPa (in H_2O)	3.7 (15)	3.7 (15)

Exhaust	Natural gas Standby rating	Propane Standby rating
Exhaust flow at rated load, m^3/min (cfm)	27.3 (965)	25.7 (908.7)
Exhaust temperature at set rated load, °C (°F)	635.2 (1175.4)	645.7 (1194.3)
Maximum back pressure, kPa (in H_2O)	8.5 (34.1)	8.5 (34.1)

Standard Set-Mounted Radiator Cooling

Ambient design, °C (°F)	50 (122)	50 (122)
Fan load, kW_m (HP)	9.0 (12)	9.0 (12)
Coolant capacity (with radiator), L (US gal)	16 (4.2)	16 (4.2)
Cooling system air flow, m^3/min (scfm)	218.0 (7700)	218.0 (7700)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)	0.12 (0.5)

Weights	Natural gas	Propane
~~Unit dry weight kgs (lbs)~~	~~1276 (2812)~~	~~1276 (2812)~~
~~Unit wet weight kgs (lbs)~~	~~1315 (2898)~~	~~1315 (2898)~~

Note: Weights represent a set with standard features. See outline drawing for weights of other configurations.

Refer to drawings for specific weights & dimensions

Derating Factors

Natural gas

Standby	Engine power available up to 488 m (1600 ft.) at ambient temperatures up to 25 °C (77 °F). Above these elevations derate at 4% per 305 m (1000 ft.) and 2% per 10 °C above 25 °C (77 °F).

Propane

Standby	Engine power available up to 488 m (1600 ft.) at ambient temperatures up to 25 °C (77 °F). Above these elevations derate at 4% per 305 m (1000 ft.) and 2% per 10 °C above 25 °C (77 °F).

Ratings Definitions

Emergency Standby Power (ESP):	Limited-Time Running Power (LTP):	Prime Power (PRP):	Base Load (Continuous) Power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

Alternator Data

Standard alternators		Natural gas/propane single phase table	Natural gas/propane three phase table					Full single phase output, reconnectable
Maximum temperature rise above 40 °C ambient		120 °C	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C
Feature code		BB90-2	B986-2	B946-2	B943-2	B952-2	BB86-2	BB88-2
Alternator data sheet number		ADS-207	ADS-207	ADS-207	ADS-207	ADS-207	ADS-207	ADS-209
Voltage ranges		120/240	120/240	120/208	277/480	347/600	127/220	120 - 480
Voltage feature code		R104-2	R106-2	R098-2	R002-2	R114-2	R020-2	Varies by voltage
Surge kW		98.7	102.7	102.7	103.9	103.9	103.2	Varies by voltage
Motor starting kVA (at 90% sustained voltage)	Shunt	360	360	360	360	360	360	516
	PMG	423	423	423	423	423	423	607
Full load current amps at Standby rating		417	301	347	150	120	328	Varies by voltage

Optional alternators for improved starting capability		Natural gas/propane single phase table	Natural gas/propane three phase table					Full single phase output, reconnectable
Maximum temperature rise above 40 °C ambient		105 °C	105 °C	105 °C	105 °C	105 °C	105 °C	Not available
Feature code		BB91-2	BB94-2	BB93-2	BB95-2	BB92-2	BB85-2	
Alternator data sheet number		ADS-208	ADS-208	ADS-208	ADS-207	ADS-207	ADS-207	
Voltage ranges		120/240	120/240	120/208	277/480	347/600	127/220	
Voltage feature code		R104-2	R106-2	R098-2	R002-2	R114-2	R020-2	
Surge kW		100.1	104.5	104.5	103.9	103.9	103.2	
Motor starting kVA (at 90% sustained voltage)	~~Shunt~~	422	422	~~422~~	360	360	360	
	PMG	497	497	497	423	423	423	
Full load current amps at Standby rating		417	301	347	150	120	328	

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

NAD-6098-EN (12/18)

Alternator data sheet

Frame size: UC3E

Characteristics

Weights:	Wound stator assembly:	320 lb	145 kg
	Rotor assembly:	373 lb	169 kg
	Complete alternator:	1041 lb	472 kg
Maximum speed:		2250 rpm	
Excitation current:	Full load:	2 Amps	
	No load:	0.5 Amps	
Insulation system:	Class H throughout		

1 Ø Ratings (1.0 power factor)		60 Hz				50 Hz		
(Based on specific temperature rise at 40 °C ambient temperature)		Double delta		4 lead		Double delta		
		120/240		120/240		110-120 220-240		
125 °C rise ratings	kW/kVA	96/96		115/115		85/85		
105 °C rise ratings	kW/kVA	84/84		100/100		75/75		
3 Ø Ratings (0.8 power factor)		Upper broad range		LBR*	347/600	Broad range		
(Based on specified temperature rise at 40 °C ambient temperature)		120/208 240/416	139/240 277/480	190-208 380-416	347/600	110/190 220/380	120/208 240/415	127/220 254/440
150 °C Rise ratings	kW	136	150	136	150	116	116	108
	kVA	170	188	170	188	145	145	135
125 °C Rise ratings	kW	128	143	128	143	112	112	104
	kVA	160	179	160	179	140	140	130
105 °C Rise ratings	kW	112	128	112	128	100	100	94
	kVA	140	160	140	160	125	125	118
80 °C Rise ratings	kW	96	110	96	110	90	90	84
	kVA	120	138	120	138	113	113	105
3 Ø Reactances (per unit, ±10%)								
(Based on full load at 105 °C rise rating)								
Synchronous		2.34	2.01	1.77	1.85	2.08	1.74	1.46
Transient		0.21	0.18	0.16	0.16	0.19	0.16	0.14
Subtransient		0.14	0.12	0.11	0.11	0.14	0.12	0.10
Negative sequence		0.16	0.14	0.12	0.12	0.14	0.12	0.10
Zero sequence		0.10	0.08	0.07	0.08	0.09	0.07	0.06
3 Ø Motor starting								
Maximum kVA	(Shunt)	422		422	422	311		
(90% sustained voltage)	(PMG)	497		497	497	389		
Time constants	(Sec)							
Transient		0.032		0.032	0.032	0.032		
Subtransient		0.010		0.010	0.010	0.010		
Open circuit		0.850		0.850	0.850	0.850		
DC		0.007		0.007	0.007	0.007		

Alternator data sheet

Frame size: UC3E

Windings	(@ 20° C)				
Stator resistance	(Line to Line, Ohms)	0.0620	0.0460	0.0900	0.0620
Rotor resistance	(Ohms)	1.3100	1.3100	1.3100	1.3100
Number of leads		12	12	6	12

* Lower broad range 110/190 thru 120/208, 220/380 thru 240/416.

Sound pressure level @ 7 meters, dB(A)

See notes 1-6 listed below

Configuration		Position (note 1)								Position average
		1	2	3	4	5	6	7	8	
Standard – unhoused	Infinite exhaust	75.5	79.9	79.3	81.5	76.8	81.7	79.7	79.9	79.7
F216-2 weather protective enclosure, aluminium	Mounted	77.4	81.3	80.4	83.4	79.3	83	80.5	80.6	81.1
F231-2 sound attenuated level 1 enclosure, aluminium	Mounted	75.7	74.8	70.5	72.6	72.5	72.6	70.3	75	73.4
F217-2 sound attenuated level 2 enclosure, aluminium	Mounted	71	71.8	69.9	71.5	71.3	70.9	68.9	71.7	71

Sound power level, dB(A)

See notes 2-4, 7 and 8 listed below

Configuration		Octave band center frequency (Hz)								Overall sound power level
		31.5	63	125	250	500	1000	2000	4000	8000	
Standard – unhoused	Infinite exhaust	55.4	71.6	82.7	91.4	99.8	102.0	101.6	99.0	93.9	107.1
F216-2 weather protective enclosure, aluminium	Mounted	57.2	89.7	96.8	94.6	100.5	101.3	100.5	97.9	95.3	107.4
F231-2 sound attenuated level 1 enclosure, aluminium	Mounted	59.1	73.8	83.3	89.9	95.6	96.8	95.5	92.0	87.9	101.9
F217-2 sound attenuated level 2 enclosure, aluminium	Mounted	61.7	73.8	83.4	88.9	94.3	92.7	91.1	87.6	83.9	98.9

Exhaust sound power level, dB(A)

See note 2 and 9 listed below

Open exhaust (no muffler) @ rated load	Octave band center frequency (Hz)									Overall sound power level
	31.5	63	125	250	500	1000	2000	4000	8000	
	41.3	79.8	88.1	87.4	98.0	96.9	97.3	99.6	99.4	105.6

Note:

1. Position 1 faces the generator front per ISO 8528-10. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7 m (23 ft) from the surface of the generator set and 1.2 m (48 in) from floor level.
2. Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
3. Data based on full rated load.
4. Sound data for generator set with infinite exhaust do not include exhaust noise.
5. Sound pressure levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
6. Reference sound pressure is 20 µPa.
7. Sound power levels per ISO 3744 and ISO 8528-10, as applicable.
8. Reference power = 1 pw (10^{-12} W).
9. Exhaust sound power levels are per ISO 6798, as applicable.

Data Sheet

Circuit Breakers

Description

This Data sheet provides circuit breaker manufacturer part numbers and specifications. The Circuit breaker box description is the rating of that breaker box installation on a Cummins Generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable Models

Engine	Models					
Kubota	C10D6	C15D6	C20D6			
QSJ2.4	C20N6	C25N6	C30N6	C30N6H	C36N6	C36N6H
	C40N6	C40N6H	C50N6H	C60N6H		
B3.3	C25D6	C30D6	C35D6	C40D6	C50D6	C60D6
QSJ5.9G	C45N6	C50N6	C60N6	C70N6	C80N6	C100N6
QSJ8.9G	C125N6	C150N6				
QSB5	DSFAC	DSFAD	DSFAE	C50D6C	C60D6C	C80D6C
	C100D6C	C125D6C				
QSB7	DSGAA	DSGAB	DSGAC	DSGAD	DSGAE	
		C125D6D	C150D6D	C175D6D	C200D6D	
QSL9	DSHAD	DQDAA	DQDAB	DQDAC		
QSM11	DQHAB					
QSX15	DFEJ	DFEK				

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.

2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an “N”, use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Please refer to the catalog numbering systems page, which is given in the chart, to understand the nomenclature of the catalog number.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16-17
H, J, and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8-9
Q	0734CT0201 http://www.schneider-electric.us/en/download/document/0734CT0201/	4

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above. http://products.schneider-electric.us/technical-library/

3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

*If the catalog number starts with “N”, skip the N and begin your search with the second letter.

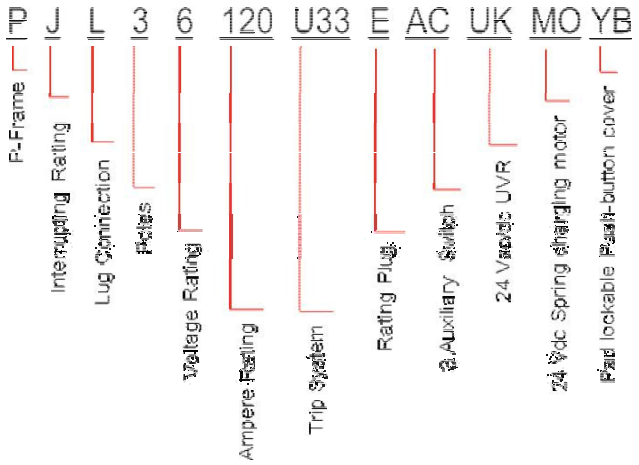
*If the first 3 letters are “PJP,” the search will not work. You will need to start with just “PJ” and use the description pages to obtain the information you are looking for on the “PJP.”

Example

After finding your circuit breaker catalog number to be "PJL36120U33EACUKMOYB," navigate to the P-frame catalog by using the link provided.

Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PJL36120.”



Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KX27-2	CB,Loc B,70A-250A,3P,LSI,600VAC,80%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX28-2	CB,Loc B,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX29-2	CB,Loc C,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX30-2	CB,Loc A,125A-400A,3P,LSI,600VAC,100%,UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX31-2	CB,Loc B,125A-400A,3P,LSI,600VAC,100%,UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX32-2	CB,Loc A,200A-600A,3P,LSI,600VAC,80%,UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX33-2	CB,Loc B,200A-600A,3P,LSI,600VAC,80%,UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX34-2	CB,Loc C,15A,3P,600VAC,80%,UL	A043L506	Schneider Electric	HDL36015	Thermal Magnetic	N/A
KX35-2	CB,Loc C,20A,3P,600VAC,80%,UL	A043L480	Schneider Electric	HDL36020	Thermal Magnetic	N/A
KX36-2	CB,Loc C,25A,3P,600VAC,80%,UL	A043L508	Schneider Electric	HDL36025	Thermal Magnetic	N/A
KX37-2	CB,LoC C,30A,3P,600VAC,80%,UL	A043L475	Schneider Electric	HDL36030	Thermal Magnetic	N/A
KX38-2	CB,Loc C,40A,3P,600VAC,80%,UL	A043L464	Schneider Electric	HDL36040	Thermal Magnetic	N/A
KX39-2	CB,Loc C,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KX40-2	CB,Loc C,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KX41-2	CB,Loc C,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KX42-2	CB,Loc C,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A

2022 EPA Exhaust Emission Compliance Statement
C100 N6
Standby
60 Hz Spark Ignited Generator Set

Compliance Information:

The engine used in this generator set complies with U.S. EPA emissions regulations under the provisions of 40 CFR Part 60, Stationary Emergency Spark-Ignited emissions limits when tested per ISO 8178 D1.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	NCEXB05.9ALB-008
Effective Date:	11/05/2021
Date Issued:	11/05/2021
EPA Engine Family (Cummins Emissions Family):	NCEXB05.9ALB

Engine Information:

Model:	QSJ5.9G-G3	Bore:	4.02 in. (102 mm)
Engine Nameplate HP:	162.7	Stroke:	4.72 in. (120 mm)
Type:	4 Cycle, In-Line, 6 Cylinder	Displacement:	359.0 cu. in. (6 liters)
Aspiration:	Turbocharged and Aftercooled	Compression Ratio:	8.5:1
Emission Control Device:	Electronic Air/Fuel Ratio Control and Closed-Loop Breather System	Exhaust Stack Diameter:	4.0 in (102 mm)

U.S. Environmental Protection Agency Station Emergency SI Emission Limits

	Grams per BHP-hr			Grams per kWm-hr		
Natural Gas	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**
Test Results	1.5	0.3	1.0	2.0	0.4	1.3
EPA Emissions Limit	2.0	1.0	4.0	2.7	1.3	5.4

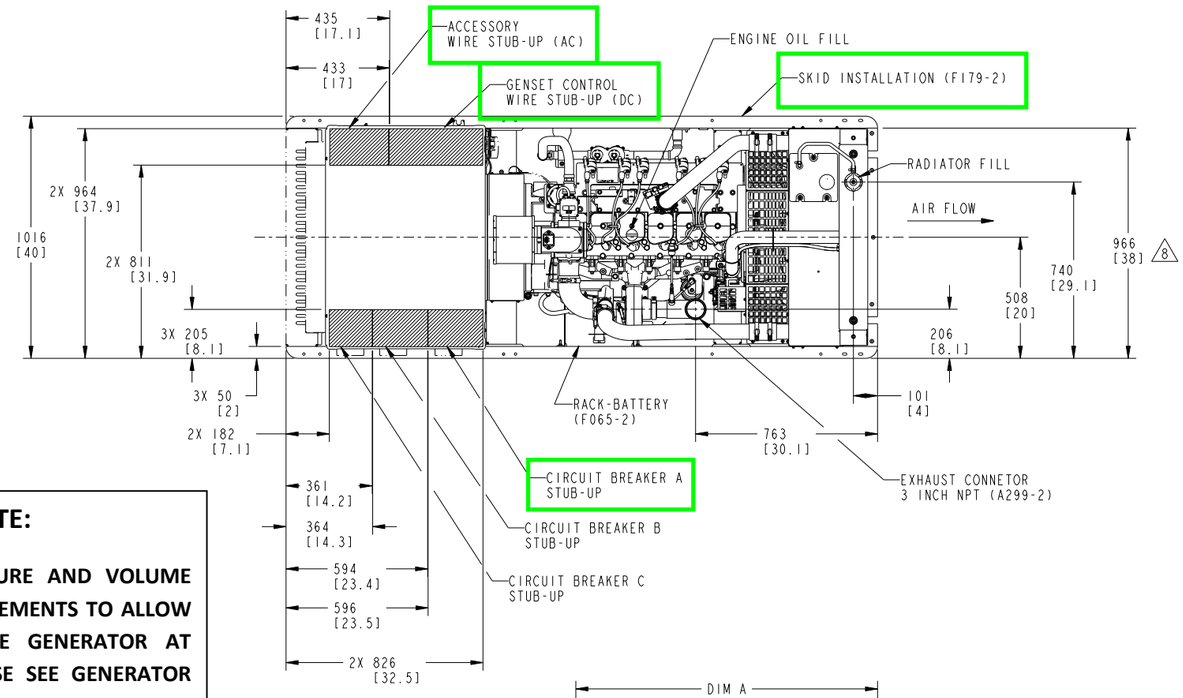
	Grams per BHP-hr			Grams per kWm-hr		
Propane (LP)	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**
Test Results	1.7	0.5	1.6	2.3	0.7	2.1
EPA Emissions Limit	2.0	1.0	4.0	2.7	1.3	5.4

Tests conducted using alternate methods, instrumentation, fuel or reference conditions can yield different results.

Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRW	CKD	APVD	DATE
ECO-152008	A	1	PRODUCTION_RELEASE	BJE	BJE	E_NORDSTROM	30APR15

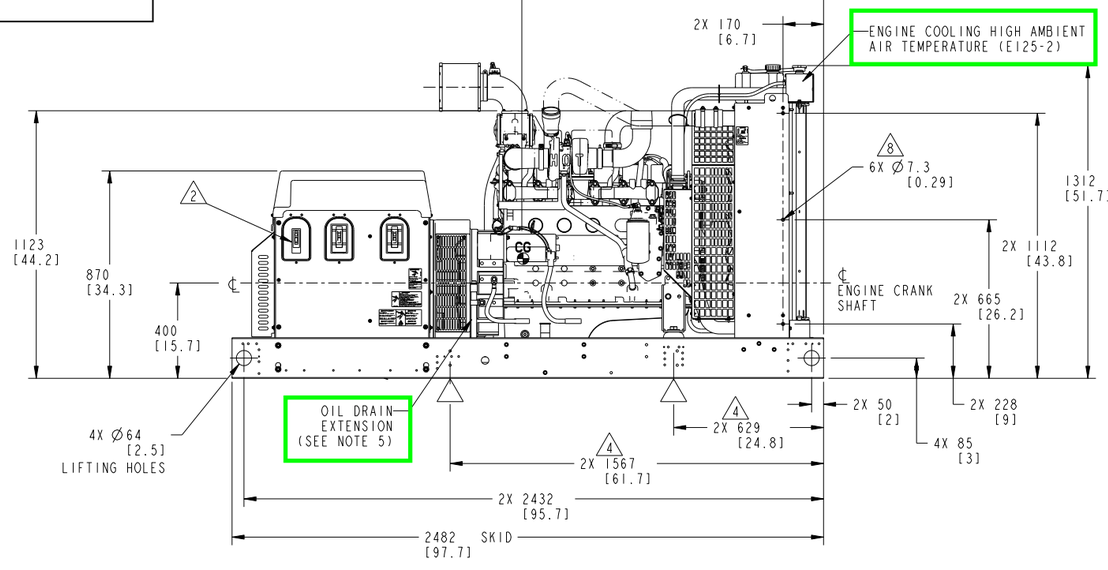


NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.
2. REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
3. CONTROL INTERFACE CONNECTION SHOULD BE MADE WITH FLEAXIBLE CONNECTIONS.
4. Ø21 [0.8] HOLES MARKED BY △ FOR SECURING TO MOUNTING SURFACE.
5. OIL DRAIN EXTENSION: 5/8 INCH HOSE ID.
6. FOR IBC SEISMIC CERTIFIED INSTALLATION, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENT DRAWING.
7. DRY WEIGHT = WET WEIGHT - 40.0 KG (85.9 LB).
8. Ø7.3 HOLES FOR OPTIONAL COOLING EXHAUST AIR DUCT ADAPTER.
9. REFER TO GENSET FOUNDATION OUTLINE FOR ELECTRICAL AND OTHER FOUNDATION SPECIFICS.
10. GENSET SUPPLIED WITH FLEXIBLE FUEL LINE(S) THAT CAN BE CONNECTED TO GENSET INTERFACE POINT(S).
    10.1 FUEL SUPPLY LINE: 686 [27.0] LONG WITH 1 INCH NPT FEMALE TERMINATION.

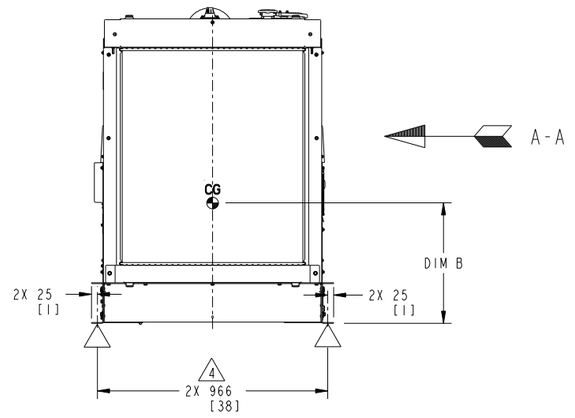
NOTE:

GAS SUPPLY PRESSURE AND VOLUME MUST MEET REQUIREMENTS TO ALLOW OPERATION OF THE GENERATOR AT 100% LOAD. PLEASE SEE GENERATOR DATA SHEETS.



TABULATION

ALT DATA SHEET #	DIM A	DIM B	GENSET WET WEIGHT KG	GENSET WET WEIGHT LB
ADS-204	1258	462	1057	2331
ADS-205	1195	460	1095	2415
ADS-206	1297	458	1130	2492
ADS-207	1287	457	1152	2540
ADS-208	1338	455	1197	2640
ADS-209	1334	452	1258	2774



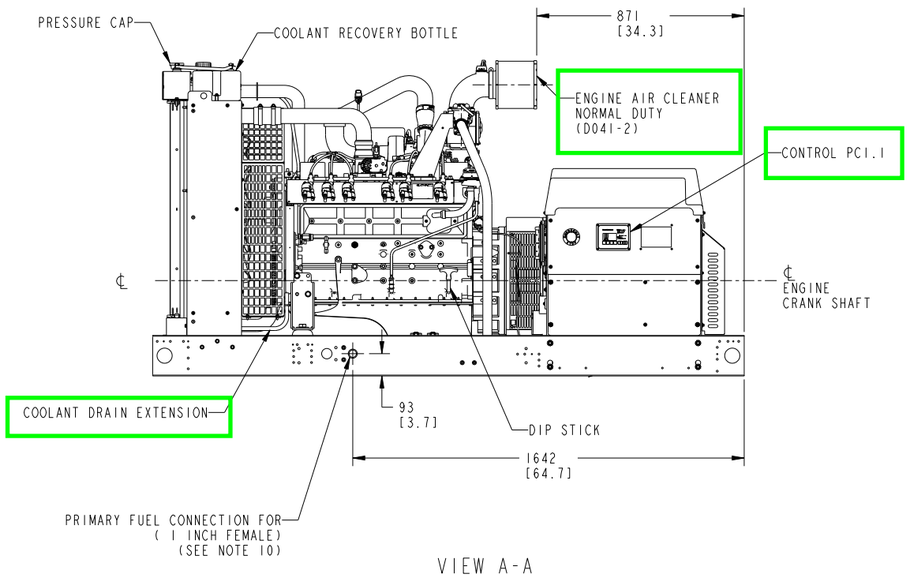
C70 N6, C80 N6, C100 N6

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			SIM TO NONE	DRW D_JADHAV		CUMMINS POWER GENERATION
DIM: X ± 1, .X ± 0.8, .XX ± 0.38	HOLE: 0.00-4.99 +0.15/-0.08; 5.00-9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		DO Nnot SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE, GENSET
ANG TOL: ± 1.0°	SCALE: 3/32		- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD E_NORDSTROM	SITE CODE	
				DATE 05FEB15	PGF	DWG SIZE D — A051E742 — SHEET 1 OF 2 — DWG REV A
				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON ARROW	

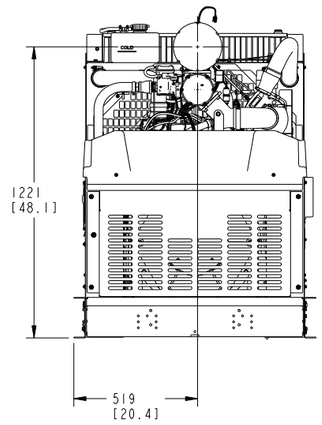
Drawing Name: A051E743 Revision: A
Part Name: A051E742 Revision: A
Sheet 1 of 3

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152008	A	1	PRODUCTION_RELEASE	BJE	BJE	E_NORDSTROM	30APR15



VIEW A-A



C70 N6, C80 N6, C100 N6

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			SIM TO NONE	DRN D_JADHAV	CUMMINS POWER GENERATION
DIM: X ±1; .X ±0.8; .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13			DO NOT SCALE PRINT	CHD N_KASIBHOTLA	
			- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	APVD E_NORDSTROM	OUTLINE,GENSET
ANG TOL: ± 1.0°	SCALE: 3/32			DATE 05FEB15	SITE CODE: PGF
				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON ARROW
					DWG SIZE D — A051E742 — SHEET 2 OF 2 — DWG REV A

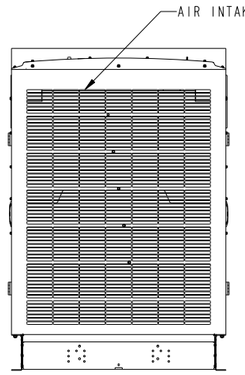
Drawing Name: A051E743 Revision: A
Part Name: A051E742 Revision: A
Sheet 2 of 3

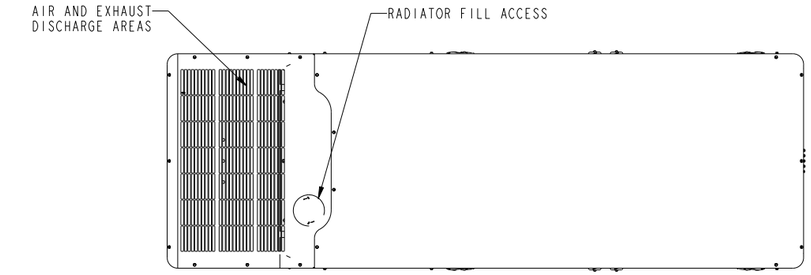
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15

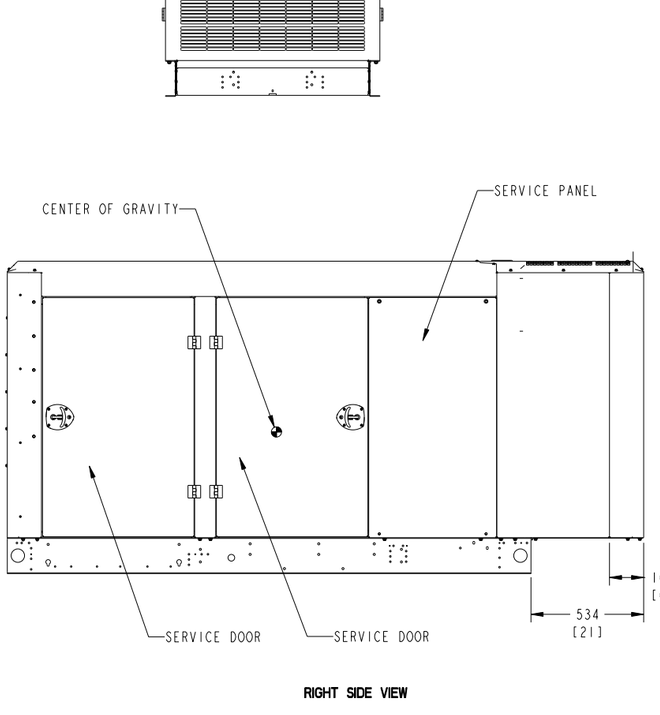
NOTES:

1. DIM [] IN INCHES
2. WHEN THE HOUSING INSTALLED ON AN OPEN GENERATOR SET, THE TOTAL WEIGHT WILL INCREASE BY ~~131.5 KG~~ (290 LBS). THIS INCLUDES THE MUFFLER.
3. THE CENTER OF GRAVITY(CG) OF THE GENERATOR SET WHEN EQUIPPED WITH THIS HOUSING SHIFTS APPROXIMATELY 65mm (2.55 inch) TOWARDS THE AIR DISCHARGE END OF THE HOUSING AND 42MM (1.66 INCH) HIGHER FROM THE GROUND. COMPARED TO THE EQUIVALENT NON-HOUSED PRODUCT WITH THE F179 SKID. SEE HOUSING READY SKID BASE OUTLINE DRAWING FOR CG LOCATION OF NON HOUSED PRODUCT.

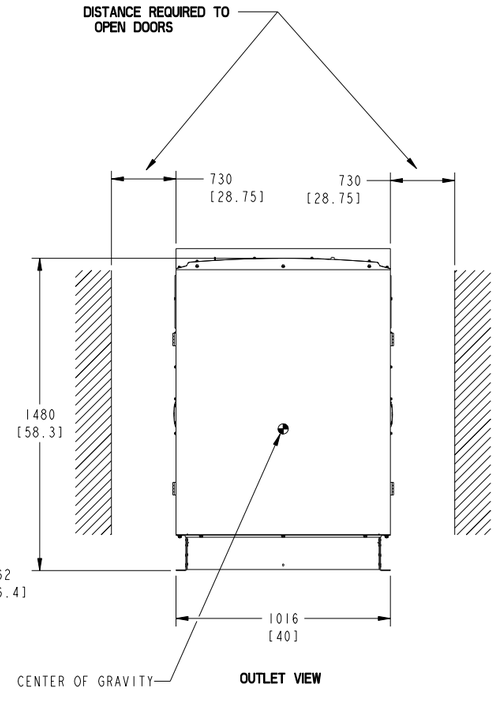




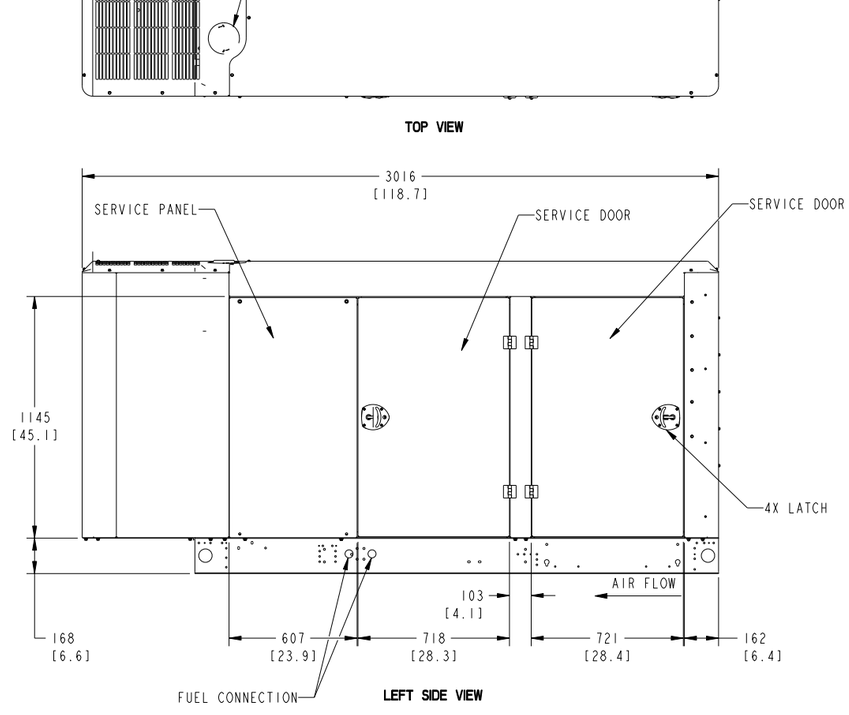
TOP VIEW



RIGHT SIDE VIEW



OUTLET VIEW



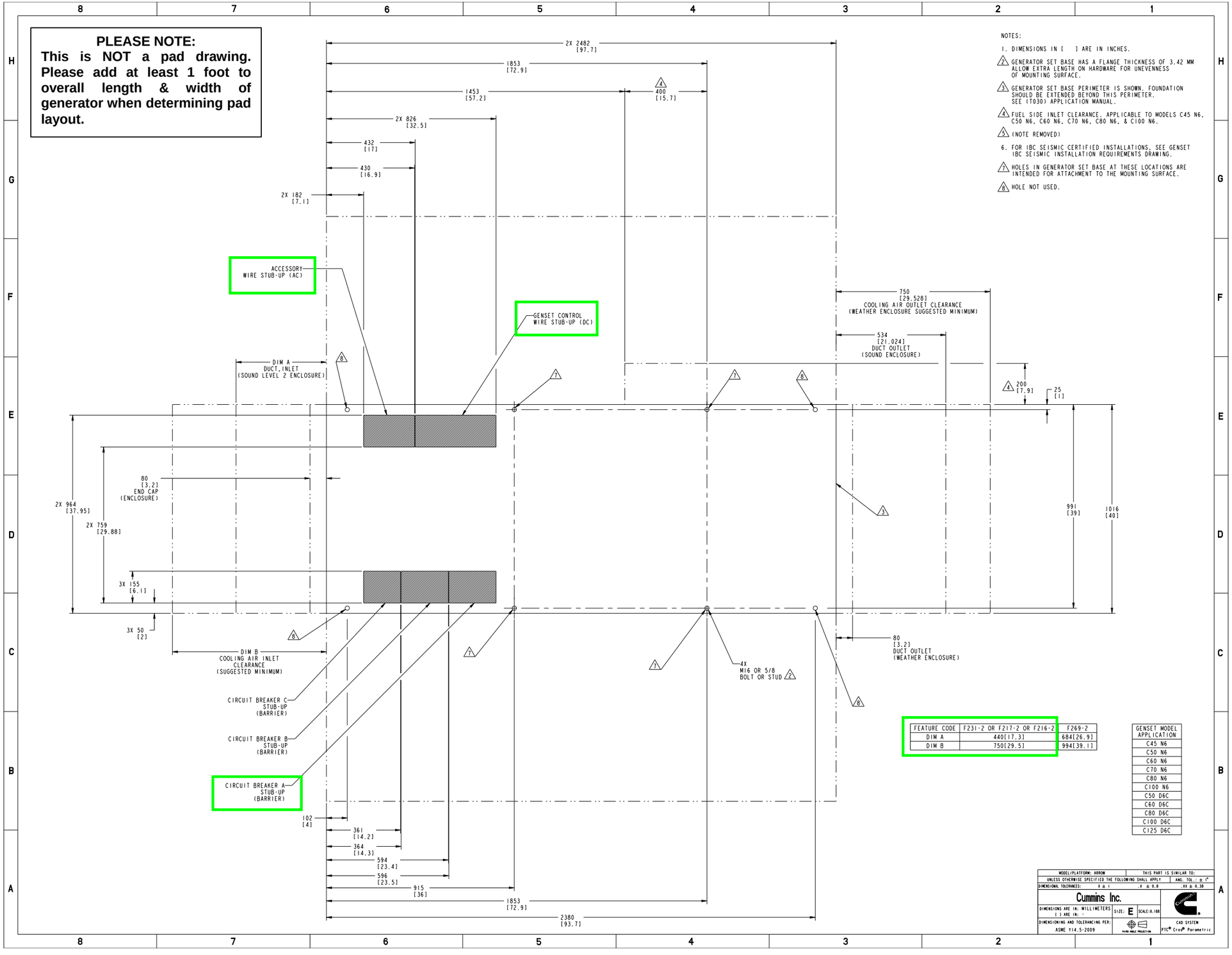
LEFT SIDE VIEW

F231-2 ENCLOSURE CONFIGURATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
ANG TOL: ± 1.0°	SCALE: ~3/32	APVD M_WICKMANN		SITE CODE	
	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	DATE 14MAY15	FIRST USED ON ARROW	PGF	DWG SIZE D — A051P365 — SHEET 1 OF 2 — DWG REV A
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994			

Drawing Name: A051P366 Revision: A
Part Name: A051P365 Revision: A
Sheet 1 of 3

PLEASE NOTE:
This is NOT a pad drawing. Please add at least 1 foot to overall length & width of generator when determining pad layout.



NOTES:

1. DIMENSIONS IN [ ] ARE IN INCHES.
2. GENERATOR SET BASE HAS A FLANGE THICKNESS OF 3.42 MM ALLOW EXTRA LENGTH ON HARDWARE FOR UNEVENNESS OF MOUNTING SURFACE.
3. GENERATOR SET BASE PERIMETER IS SHOWN, FOUNDATION SHOULD BE EXTENDED BEYOND THIS PERIMETER. SEE (T030) APPLICATION MANUAL.
4. FUEL SIDE INLET CLEARANCE, APPLICABLE TO MODELS C45 N6, C50 N6, C60 N6, C70 N6, C80 N6, & C100 N6.
5. (NOTE REMOVED)
6. FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.
7. HOLES IN GENERATOR SET BASE AT THESE LOCATIONS ARE INTENDED FOR ATTACHMENT TO THE MOUNTING SURFACE.
8. HOLE NOT USED.

FEATURE CODE	F231-2 OR F217-2 OR F216-2	F269-2
DIM A	440[17.3]	684[26.9]
DIM B	750[29.5]	994[39.1]

GENSET MODEL APPLICATION
C45 N6
C50 N6
C60 N6
C70 N6
C80 N6
C100 N6
C50 D6C
C60 D6C
C80 D6C
C100 D6C
C125 D6C

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO:
UNLESS OTHERWISE SPECIFIED THE FOLLOWING SHALL APPLY	ANG. TOL.: ± 1°
DIMENSIONAL TOLERANCES: X ± 1	.X ± 0.8 .XX ± 0.30
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN:	SIZE: E SCALE:0.100
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

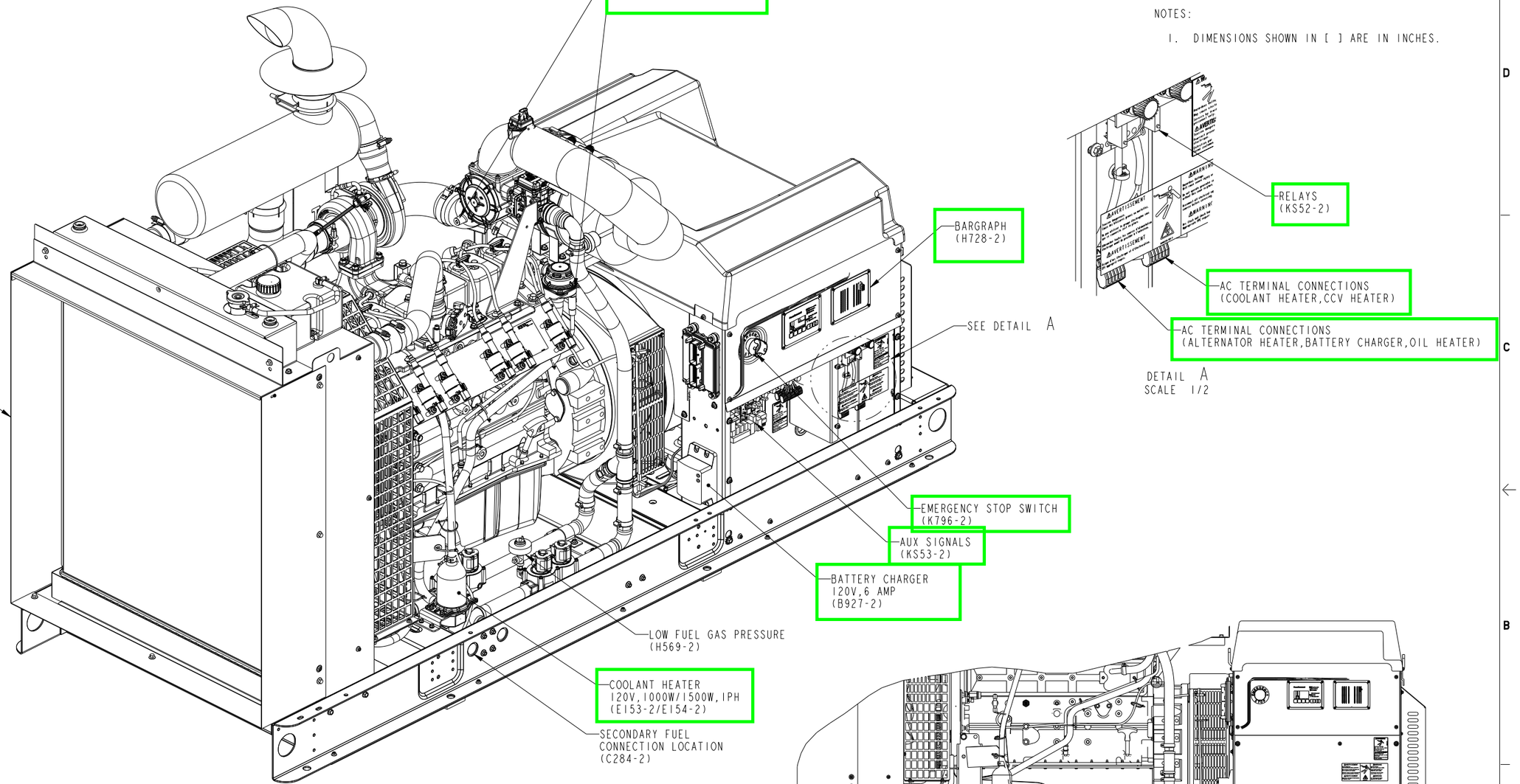
Part Number: **A050P698** Part Revision: **E**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Detail** State: **Released** Sheet **1** of **2**

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-168340	B	1	ADD NOTE 1	AGJ	AGJ	E_NORDSTROM	28FEB17
		2	ADD SHEET 3	AGJ	AGJ	E_NORDSTROM	28FEB17

NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.



DETAIL A
SCALE 1/2

SCALE 1/8

C45 N6, C50 N6,
C60 N6, C70 N6,
C80 N6, C100 N6

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X	±1	0.00- 4.99	+0.15/-0.08
.X	±0.8	5.00- 9.99	+0.20/-0.10
.XX	±0.38	10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL: ± 1.0° SCALE: 3/16

SIM TO NONE
DO NOT SCALE PRINT
- CONFIDENTIAL -
PROPERTY OF CUMMINS POWER GENERATION GROUP

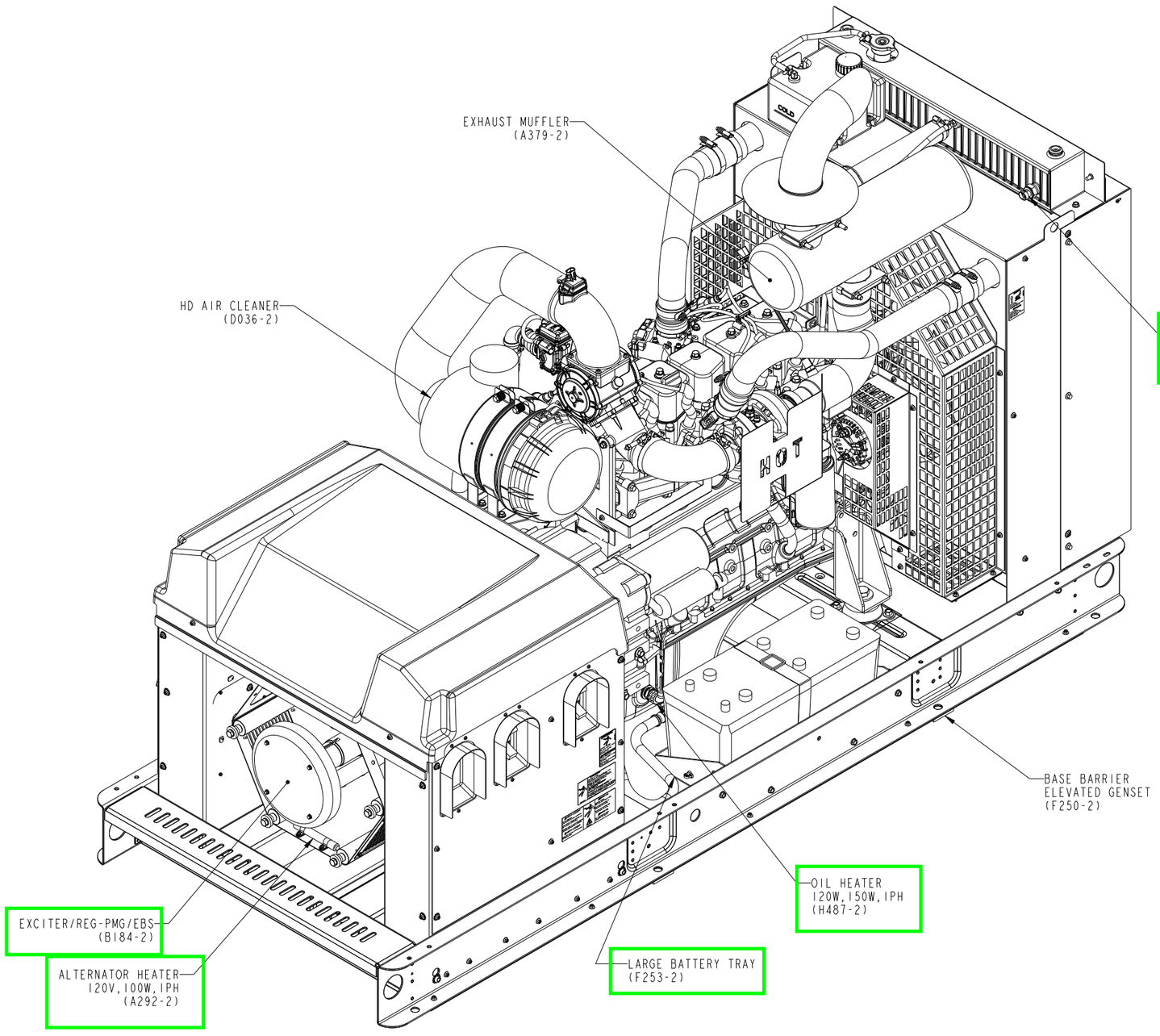
DWN R_HALVERSON
CKD E_NORDSTROM
APVD E_NORDSTROM
DATE 23APR15
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON ARROW

CUMMINS POWER GENERATION
OUTLINE,GENSET
OPTIONS
SITE CODE PGF
DWG SIZE D
A051E744
SHEET 1 OF 3
DWG REV A

Drawing Name: A051E745 Revision: B
Part Name: A051E744 Revision: B
ECO-168340 Sheet 1 of 4

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-168340	B	-	-----	AGJ	AGJ	E.NORDSTROM	28FEB17



C45 N6, C50 N6,
C60 N6, C70 N6,
C80 N6, C100 N6

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X	± 1	0.00- 4.99	+0.15/-0.08
.X	± 0.8	5.00- 9.99	+0.20/-0.10
.XX	± 0.38	10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL: ± 1.0° SCALE: 3/16

SIM TO NONE
DO NOT SCALE PRINT
- CONFIDENTIAL -
PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN R_HALVERSON
CKD E_NORDSTROM
APVD E_NORDSTROM
DATE 23APR15
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON ARROW

SITE CODE PGF

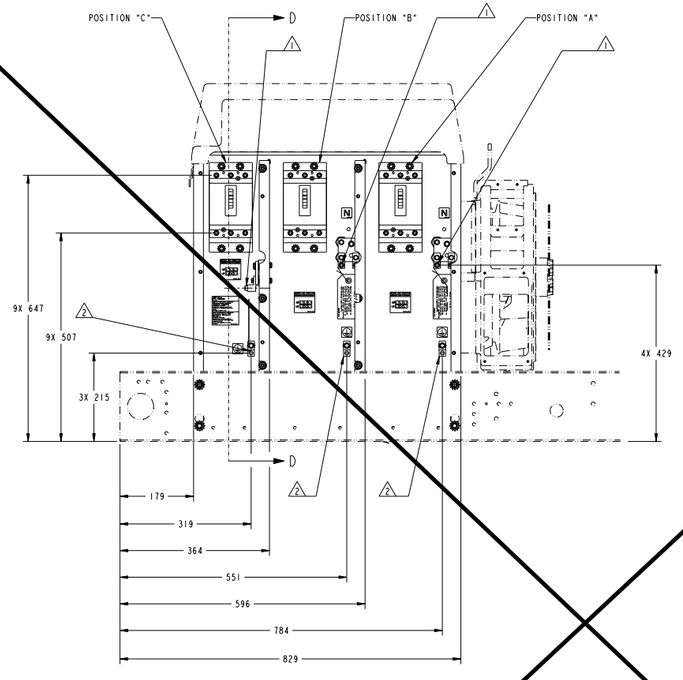
CUMMINS POWER GENERATION
OUTLINE, GENSET
OPTIONS
DWG SIZE D | A051E744 | SHEET 2 of 3 | DWG REV A

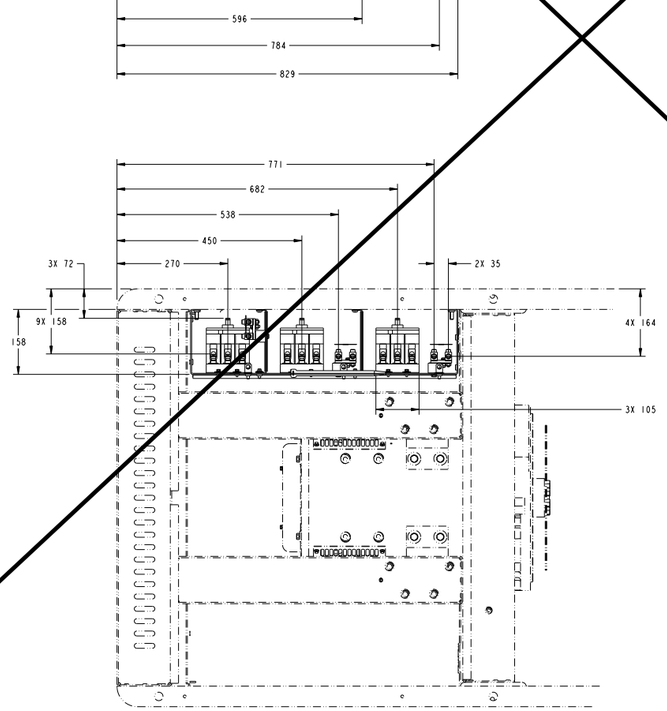
Drawing Name: A051E745 Revision: B
Part Name: A051E744 Revision: B
ECO-168340 Sheet 2 of 4

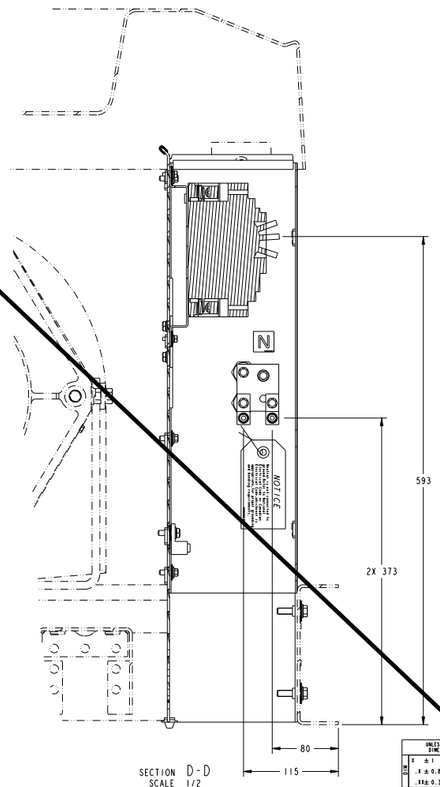
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	BY	CHK	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		2	DRAWING HAS BEEN PICTORIALLY UPDATED	KD	PL	P.LARSON	20APR15
		3	RMV. C11 LABEL	KD	PL	P.LARSON	20APR15
		4	UPDATE NOTES & TAB - SEE ECO	KD	PL	P.LARSON	20APR15
		5	SEE SHEET 2	KD	PL	P.LARSON	20APR15
		6	SEE SHEET 3	KD	PL	P.LARSON	20APR15

"H" FRAME SHOWN (15 - 150 amp)







SECTION D-D
SCALE 1/2

NOTES:

1. NEUTRAL LUG (1) #14-2/0
2. GROUND LUG (1) #14-1/0
3. NEUTRAL LUG (1) #6-350 kcmil.
4. NEUTRAL LUG (2) #2-600 kcmil OR (4) 1/0-250 kcmil.

FRAME	LUG	LUG WIRE RANGE	WIRE STRIP LENGTH	CB LUG TORQUE
H-FRAME THERMAL-MAGNETIC 15-150 AMP 80% RATED	AL150HD	(1) AL #14 - 3/0 AWG (1) CU #14 - 3/0 AWG	0.65 inch	#14 - #10 50 lb-in (6.0 Nm) #8 - 3/0 120 lb-in (14.0 Nm)
J-FRAME THERMAL-MAGNETIC 175 AMP 80% RATED	AL175HD	(1) AL #4 - 4/0 AWG (1) CU #4 - 4/0 AWG	1.00 inch	225 lb-in (26.0 Nm)
J-FRAME THERMAL-MAGNETIC 200-250 AMP 80% RATED	AL250JD	(1) AL 3/0 - 350 kcmil (1) CU 3/0 - 350 kcmil	1.00 inch	225 lb-in (26.0 Nm)
J-FRAME LSI ELECTRONIC TRIP ADJUSTABLE TRIP 70-250 AMP 100% RATED, COPPER CONDUCTORS ONLY	CU250JD	(1) CU 1/0 - 300 kcmil	1.00 inch	250 lb-in (28.0 Nm)
L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 80% RATED	AL400LG1K3	(1) AL #2 - 500 kcmil (1) CU #2 - 600 kcmil	1.20 inch	442 lb-in (50 Nm)
L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 100% RATED, COPPER CONDUCTORS ONLY	AL600LS52K3	(2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)
L-FRAME (600) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 200-600 AMP 80% RATED	AL600LS52K3	(2) AL 2/0 - 500 kcmil (2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)

CIRCUIT BREAKER ACCESSORIES	
1	SHUNT TRIP (MX) P/N A043X760 12 VDC COIL BURDEN < 5 WATTS 10 AMP INRUSH
2	AUXILIARY CONTACTS P/N A043X785 OPEN/CLOSED (OC) TRIP INDICATION (TP1) FORM C CONTACTS RATING: 6 AMPS AT 24 VAC, 48 VAC, 110 VAC 6 AMPS AT 24 VDC 2.5 AMPS AT 48 VDC 0.4 AMPS AT 110 VDC H & J FRAME, MAXIMUM OF 4 CONTACTS PER CIRCUIT BREAKER L FRAME, MAXIMUM OF 5 CONTACTS PER CIRCUIT BREAKER

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DEC	X ±1	MACH	0.00 - 4.99 ±0.15/-0.00
	.X ±0.8		5.00 - 9.99 ±0.20/-0.10
	.XX±0.38		10.00 - 17.49 ±0.25/-0.13
ANG TOL: ± 1.0°			17.50 - 24.99 ±0.30/-0.13

DO NOT SCALE PRINT

CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

THIS INSTRUCTION IS TO BE USED IN CONJUNCTION WITH ARROW

SCALE: 1/4

DRN	K.DEIVASIGAMANI
CHK	P.LARSON
APVD	P.LARSON
DATE	21JAN15

CUMMINS POWER GENERATION

OUTLINE, CIRCUIT BREAKER

SITE CODE: PGF

DWG NO: A049J918

SHEET: 1 OF 3

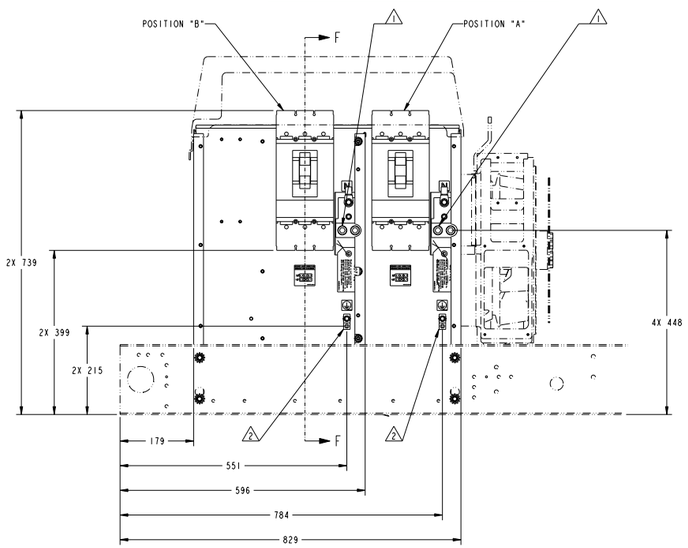
REV: B

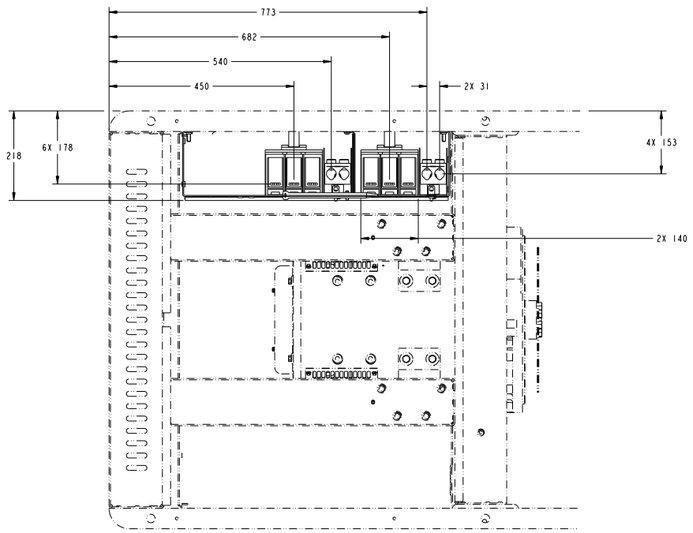
Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 1 of 4

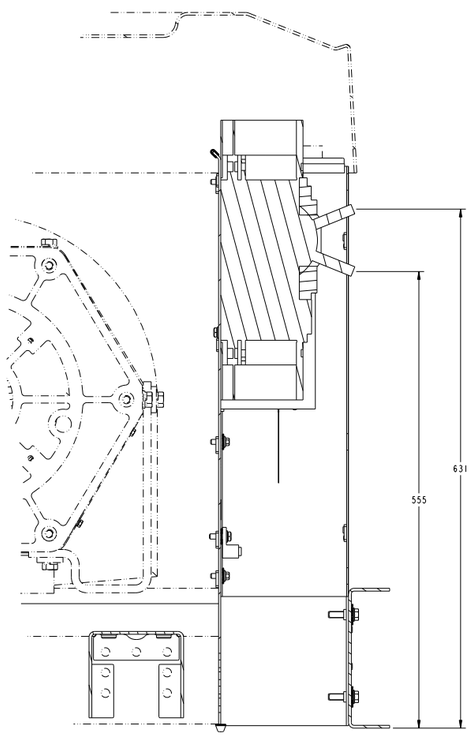
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	BY	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		6	ZONE (D3) ADD PHRASE "(400-600 amp)"	--	--	--	
			TO "L" FRAME SHOWN"	KD	PL	P.LARSON	20APR15

"L" FRAME SHOWN (400 - 600 amp)



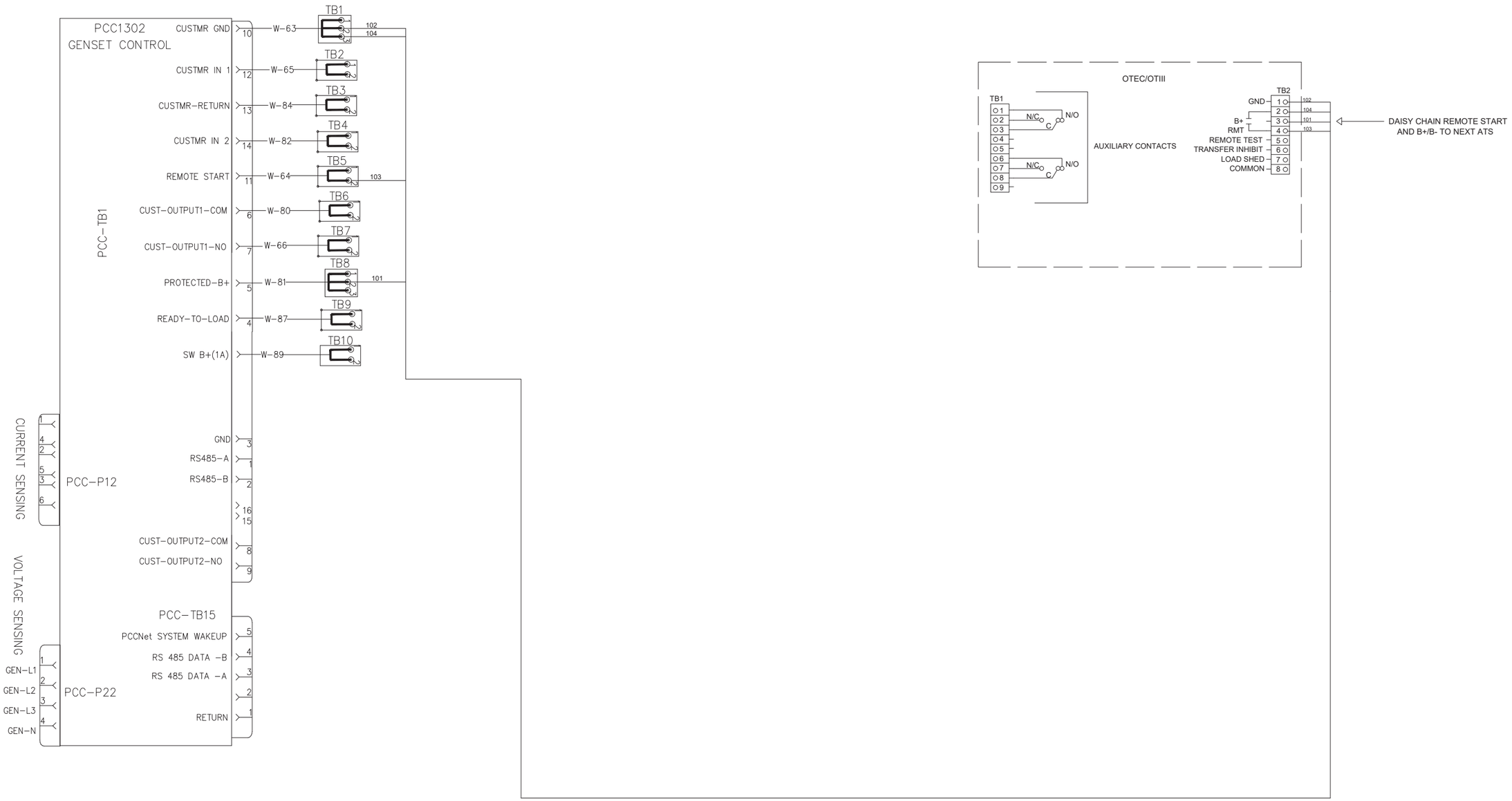




SECTION F-F
SCALE 1/2

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS ARE IN MILLIMETERS	DO NOT SCALE PRINT	DRN K.DEIVASIGAMANI	CUMMINS POWER GENERATION
X ±1 / .X ±0.8 / .XXX 0.38	0.00-4.99 ±0.15/-0.00 5.00-9.99 ±0.20/-0.10 10.00-17.49 ±0.25/-0.13 17.50-24.99 ±0.30/-0.13	CHK P.LARSON APVD P.LARSON DATE 21JAN15	SITE CODE PGF
ANG TOL: ± 1.0°	SCALE: 1/4	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	OUTLINE,CIRCUIT BREAKER
		DFX INTERPRETATION PER ASME Y14.41-2003	FIRST USED ON ARROW
			SIZE D DWG NO A049J918 SHEET 3 OF 3 REV B

Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 3 of 4



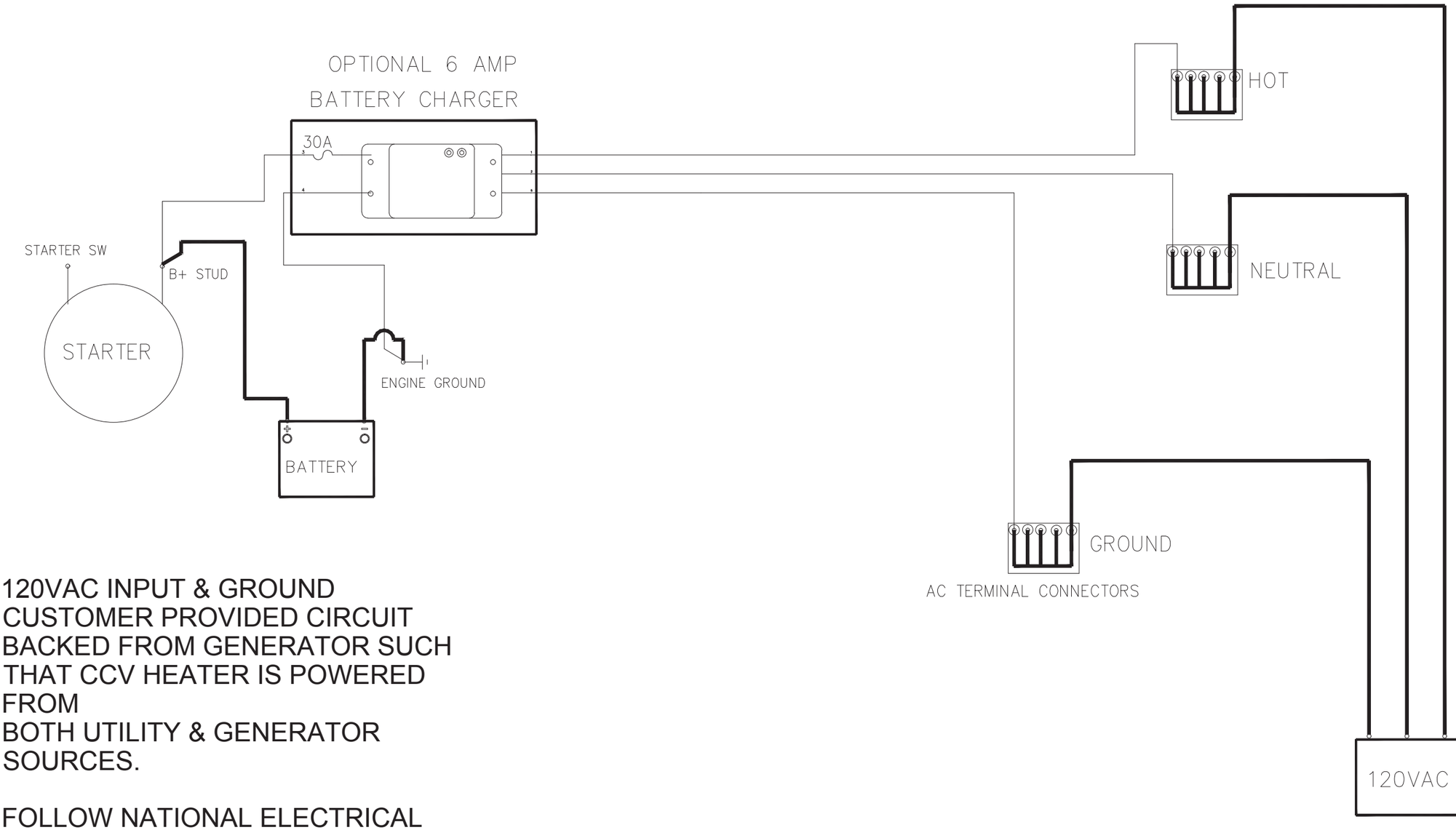
NOTES:

1.) LONWORKS RECOMMEND CABLE TYPE: BELDEN 8471 UNSHIELDED TWISTED PAIR
2.) PCCNET AND RS485 RECOMMENDED CABLE TYPE: BELDEN 9729 SHIELDED TWISTED PAIR
3.) MODLON GATEWAY TO PC500-550 CONNECTION CABLE CPG PN: A040T087
4.) USB HOST IS USED TO ATTACH AN EXTERNAL USB DRIVE TO EXTEND THE PC 500-550 MEMORY
5.) SD CARD SLOT IS USED TO EXTEND THE PC 500-550 MEMORY
6.) EITHER USB HOST OR SD CARD CAN BE USED AT A TIME, NOT BOTH
7.) USB DEVICE IS USED BY A PC TO SETUP THE PC 500-550
8.) PULL 20% MORE CONDUCTORS FOR SPARES

CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR:	DATE:
D.BAUER	27SEPT2016
DRAWING NAME: INT 1.X CONNECT SERIES 9031	PAGE:



120VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
FROM
BOTH UTILITY & GENERATOR
SOURCES.

FOLLOW NATIONAL ELECTRICAL
CODE
FOR INSTALLATION.

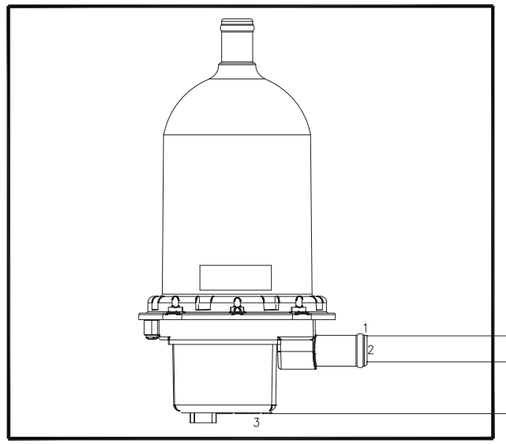
CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

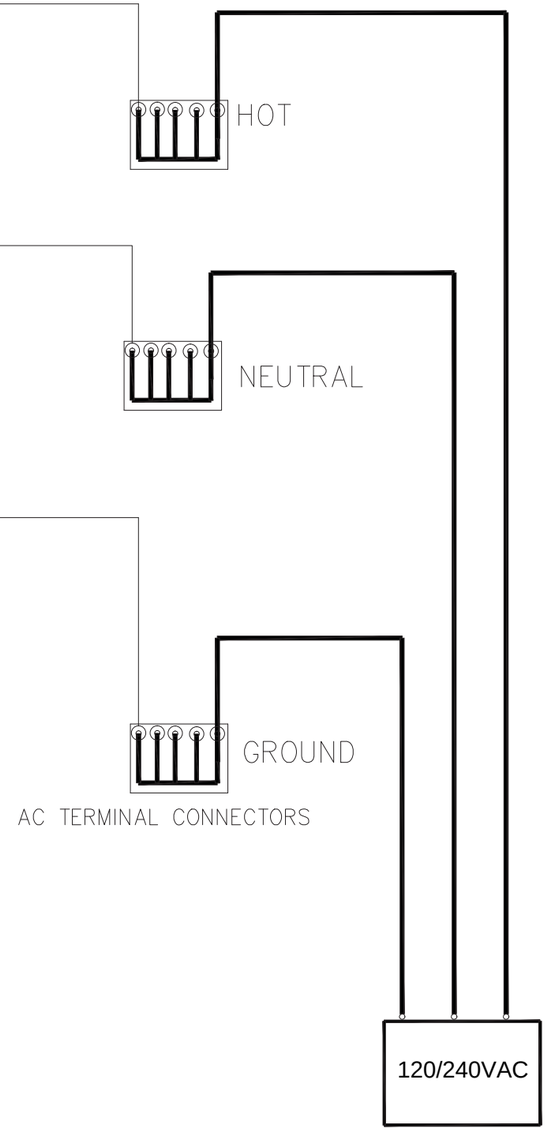
AUTHOR:	DATE:
D.BAUER	27SEPT2016
DRAWING NAME: CONNECT SERIES BATT CHARGER 9030	PAGE:

OPTIONAL

COOLANT HEATER



T–STAT



120/240VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
FROM
BOTH UTILITY & GENERATOR
SOURCES.

FOLLOW NATIONAL ELECTRICAL
CODE
FOR INSTALLATION.

CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA		AUTHOR: D.BAUER	DATE: 27SEPT2016
		DRAWING NAME: CONNECT SERIES BLOCK HEATER 9029	PAGE:

Section II

POWERCOMMAND® OTEC TRANSFER SWITCH

POWERCOMMAND® 40 CONTROL | OPEN TRANSITION | 40 A–1200 A

AUTOMATIC TRANSFER SWITCH

DESCRIPTION

The OTEC series transfer switch provides the basic features typically required for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications. The are suitable for use in emergency, legally required, and optional standby circuits in commercial and light industrial applications. The OTEC transfer switch features the new PowerCommand® 40 control with a comprehensive feature list to suit a wide variety of ATS applications.

FEATURES

PowerCommand® 40-01 control – A fully featured microprocessor-based control with LCD digital display and tactile-feel soft-switches for easy operation and screen navigation. Control highlights include Modbus communication, front panel PC software configuration. Advanced features include, three phase sensing on both sources, manual restore to S1, synch check, and event logging capability. Please see the S-6560 PowerCommand® 40-01 control specification sheet for the full description, benefits and features.

Programmed transition – Open transition timing can be adjusted to completely disconnect the load from both sources for a programmed time period, as recommended by NEMA MG-1 for transfer of inductive loads.

Advanced transfer switch mechanism – Unique bi-directional linear actuator provides virtually frictionless constant force, straight-line transfer switch action during automatic operation.

Positive interlocking – Mechanical and electrical interlocking prevent source-to-source connection through the power or control wiring.

Main contacts – Heavy-duty silver alloy contacts used with multi-leaf arc chutes are rated for motor loads or total system load transfer. They require no routine contact maintenance. Continuous load current not to exceed 100% of switch rating and tungsten loads not to exceed 30% of switch rating.

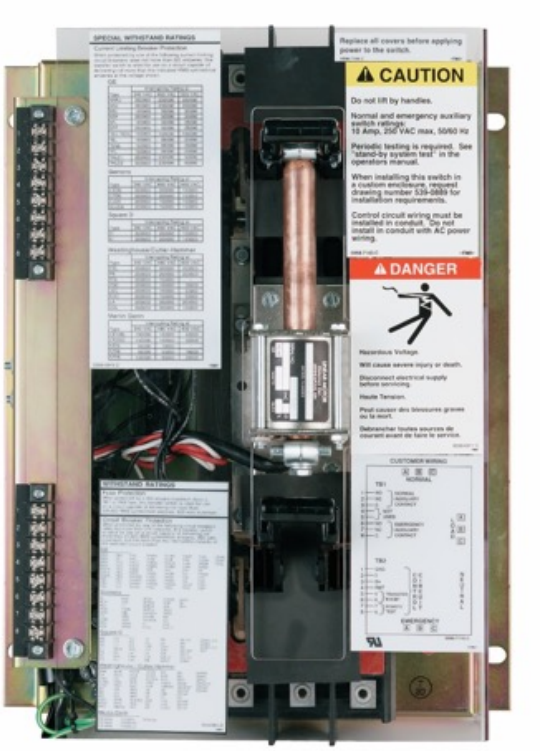
Ease of service and access – Single-plug harness connection and compatible terminal markings simplify servicing. Access space is ample. Door-mounted controls are field-programmable; no special tools are required.

Complete product line – Cummins is a single source supplier with a wide range of equipment, accessories and services to suit virtually any backup power application.

Warranty and service – Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.

TRANSFER SWITCH MECHANISM

- Transfer switch mechanism is electrically operated and mechanically held in the Source 1 and Source 2 positions. The transfer switch incorporates electrical and mechanical interlocks to prevent inadvertent interconnection of the sources.
- Independent break-before-make action is used for both 3-pole and 4-pole simultaneously switched neutral. This design allows use of sync check operation when required, or control of the operating speed of the transfer switch for proper transfer of motor and rectifier-based loads (programmed transition feature).
- True 4-pole switching allows for proper ground (earth) fault sensing and consistent, reliable operation for the life of the transfer switch. The neutral poles of the transfer switch have the same ratings as the phase poles and are operated by a common crossbar mechanism, eliminating the possibility of incorrect neutral operation at any point in the operating cycle, or due to failure of a neutral operator.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- High pressure silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contact wear is reduced by multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases to prevent interphase flashover. A transparent protective cover allows visual inspection while inhibiting inadvertent contact with energized components.
- Switch mechanism, including contact assemblies, is UL 1008 certified to verify suitability for applications requiring high endurance switching capability for the life of the transfer switch. Withstand and closing ratings are validated using the same set of contacts, further demonstrating the robust nature of the design.



SPECIFICATIONS	
Voltage rating	Up to 600 V AC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes provide dependable arc interruption.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two isolated contacts (one for each source) indicating switch position are provided for customer use. Contacts are normally open, and close to indicate connection to the source. Wired to terminal block for easy access. Rated at 10 A Continuous and 250 V AC maximum.
Operating temperature	-22 ˚F (-30 ˚C) to 140 ˚F (60 ˚C)
Storage temperature	-40 ˚F (-40 ˚C) to 140 ˚F (60 ˚C)
Humidity	Up to 95 % relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m) without derating
Surge withstand ratings	Voltage surge performance and testing in compliance with the requirements of IEEE C62.41 (Category B3) and IEEE C62.45.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition enabled.
Manual operation*	Transfer switch mechanisms are equipped with means to manually transfer. All sources must be de-energized before manual operation is attempted.

**See Operator Manual for further details.*

TRANSITION MODES

Open delayed transition – In this transition mode the time required for the transfer switch to transfer between sources is adjustable so that the load-generated voltages decay to a safe level before connecting to an energized source. Recommended by NEMA MG-1 to prevent nuisance tripping breakers and load damage. Adjustable 0.5 secs-10 minutes, and default 0.5 seconds.

Open in-phase translation – Initiates open transition transfer when in-phase monitor senses both sources are in phase (voltage, phase and frequency). Operates in a break-before-make sequence. Includes ability to enable programmed transition as a backup. The module waits indefinitely for synchronization unless the 'Return to programmed transition' function is active in which case after 2 minutes it performs a programmed delayed transfer.

UL 1008 WITHSTAND AND CLOSING RATINGS (WCR)

The transfer switches listed below must be protected by circuit breakers or fuses. Referenced drawings include detailed listings of specific breakers or fuse types that must be used with the respective transfer switches. Consult with your distributor/dealer to obtain the necessary drawings. Withstand and Closing Ratings (WCR) are stated in symmetrical RMS amperes.

BREAKER PROTECTION

		MOLDED CASE CIRCUIT BREAKER (MCCB) PROTECTION				SPECIAL CIRCUIT BREAKER PROTECTION		
Frame	Amperage rating (A)	With specific manufacturers MCCB (kA at 480V)	With specific manufacturers MCCB (kA at 600V)	Max MCCB ratings (A)	Drawing reference	With specific Current limiting breakers (kA at 600V)	Max. Current limiting breakers CLB rating (A)	Drawing reference
A	40, 75, 125 (3-pole only)	14	14	225	A050J441	200	225	A048J566
	40, 75, 125 (4-pole only)	30	30	400	A048E949	200	400	A051D533
B	150, 225, 260	30	30	400	A048E949	200	400	A051D533
C	300, 400, 600	65	65	1200	A056M829	200	1200	A048J564
D	800, 1000	65	50	1400	A056M821	200	1400	A048J562
E	1200	85	65	1600	A056M825	200	1600	A048P186

FUSE PROTECTION

Frame	Amperage rating (A)	WCR with current limiting fuses (kA)	Fuse size and type	Drawing reference
A	40, 75, 125 (3 and 4-pole)	200	200 A, Class: J, RK1, RK5, T	A050J441
B	150, 225, 260	200	1200 A Class L or T, or 600A class J, RK1, RK5	A048E949
C	300, 400, 600	200	1200 A Class L or T, or 600A class J, RK1, RK5	A056M829
D	800, 1000	200	2000 A Class L or 1200 A Class T or 600 A Class J, RK1, RK5	A056M821
E	1200	200	2000 A Class L or 1200 A Class T or 600 A Class J, RK1, RK5	A056M825

**All WCR values are at 600 V*

TIME BASED RATINGS: 0.05S (3-CYCLES AT 60 HZ)

Frame	Amperage rating (A)	WCR (kA at Vmax and below)	Max. MCCB rating (A)	Drawing reference
C	300, 400, 600	25 at 600 V	1200	A056M829
D	800, 1000	35 at 600 V	1400	A056M821
E	1200	42 at 600 V	1600	A056M825

TRANSFER SWITCH LUG CAPACITIES			
Frame	**Amperage rating (A)**	**Cables per phase**	**Size**
A	40, 70, 125 3-pole	1	#12 AWG-2/0
	40 4-pole	1	#12 AWG-2/0
	70, 125 4-pole	1	#6 AWG – 300MCM
B	150, 225	1	#6 AWG – 300MCM
	260	1	#6 AWG – 400MCM
C	300 400	2	One accepts 3/0 AWG – 600 MCM and One #4 AWG – 250 MCM
	600	2	250 – 500 MCM
D	800, 1000	4	250 – 500 MCM
E	1200	4	#2 AWG to 600 MCM standard (feature N045) 1/0 AWG to 750 MCM optional (feature N066) Compression Lug Adapter optional (feature N032)

**All lugs 90°C rated and accept copper or aluminum wire unless indicated otherwise.*
Refer to the latest NFPA 70 Article 310 - Conductors for general wiring for the ampacity calculations.

ENCLOSURE

The transfer switch and control are wall-mounted in a key-locking enclosure. Wire bend space complies with 2017 NEC.

DIMENSIONS – TRANSFER SWITCH IN UL TYPE 1 ENCLOSURE									
Frame	**Amperage rating (A)**	**Height**		**Width**		**Depth**		**Weight**	
		in	mm	in	mm	in	mm	lb	kg
A	40, 70, 125 3-pole	27	686	20.5	521	12	305	82	37
	40, 70, 125 4-pole	35.5	902	26	660	16	406	165	75
B	150, 225	35.5	902	26	660	16	406	165	75
	260	43.5	1105	28.5	724	16	406	170	77
C	300 400, 600	54	1372	25.5	648	18	457	225	~~102~~
D	800, 1000	68	1727	30	762	19.5	495	360	163
E	1200	90	2286	39	991	27	698	730	331

DIMENSIONS – TRANSFER SWITCH IN UL TYPE 3R, 4, 4X, OR 12 ENCLOSURE										
Frame	**Amperage rating (A)**	**Height**		**Width**		**Depth**		**Weight**		**Cabinet Type**
		in	mm	in	mm	in	mm	lb	kg	
A	40, 70, 125 3-pole	34	864	26.5	673	12.5	318	125	57	3R, 12, 4
		46	1168	32	813	16	406	255	102	4X
	40, 70, 125 4-pole	42.5	1080	30.5	775	16	406	215	97	3R, 12, 4
		46	1168	32	813	16	406	215	102	4X
B	150, 225	42.5	1080	30.5	775	16	406	1118	97	3R, 12, 4
		46	1168	32	813	16	406	255	102	4X
	260	46	1168	32	813	16	406	255	102	3R, 12, 4, 4X
C	300, 400, 600	59	1499	27.5	699	16.5	419	275	125	3R, 12, 4
		73.5	1867	32.5	826	19.5	495	410	186	4X
D	800, 1000	3.5	1867	32.5	826	19.5	495	410	186	3R, 12, 4, 4X
E	1200	90	2286	39	991	27	698	730	331	3R, 12, 4, 4X

ENCLOSURE ACCESS FOR CABLE INSTALLATION AND MAINTENANCE

All frames allow for top, side, and bottom cable entry. NEC Requires Minimum 36" Front Access. Additional front clearance is needed to remove the mechanism. Refer to the outline drawing.

OTEC DRAWING PART NUMBERS

		Outline Drawing				
Frame	Amperage rating (A)	Type 1	Type 3R & 12	Type 4	Type 4X	Open construction
A	40, 70, 125 3-pole	0310-0544	0310-0453	0310-0445	0500-4184	A065S429
	40, 70, 125 (4-pole)	0500-4896			0500-4896	
B	150, 225	0310-0414	0310-0454	0310-0446	0500-4184	
	260	0310-0540	0310-0455	0310-0447	0500-4184	
C	300, 400, 600	0310-1307	0310-1315	0310-1316	0500-4185	
D	800, 1000	0310-0417	0310-0457	0310-0449	0500-4185	
E	1200	A065S431		A065S432		A065S430

WIRING DIAGRAM PART NUMBERS

		Wiring Diagram				
Frame	Amperage rating (A)	Utility to Genset (120 – 480 V)	Utility to Genset (600 V)	Interconnection	Utility to Genset, Open Construction (120 – 480 V)	Utility to Genset, Open Construction (600 V)
A	40, 70, 125 3-pole	A065K034	A065H782	A065H780	A065H783	A065H784
	40, 70, 125 (4-pole)					
B	150, 225					
	260					
C	300, 400, 600					
D	800, 1000	A065H781				
E	1200					

SUBMITTAL DETAIL

Model
- 40, 70, 125 A, (3- and 4-pole)
- 150, 225, 260 A
- ✔ 300, 400, 600 A
- 800, 1000 A
- 1200 A

Poles
- ✔ A028 Poles – 3 (solid neutral)
- A029 Poles – 4 (switched neutral)

Application
- ✔ A035 Utility-to-genset

Frequency
- ✔ A044 60 Hz
- A045 50 Hz

Phase
- A041 single phase, 2-wire or 3-wire
- ✔ A042 three phase, 3-wire or 4-wire

Voltage ratings
- R020 120V
- R038 190V
- ✔ R021 208V
- R022 220V
- R023 240V
- R024 380V
- R025 416V
- R035 440 V
- R026 480 V
- R027 600 V

Enclosure
- ✔ B001 Type 1: Indoor use, provides some protection against dirt (similar to IEC type IP30)
- B002 Type 3R: Intended for outdoor use, provides some protection from dirt, rain and snow (similar to IEC type IP34)
- B003 Type 4: Indoor or outdoor use, provides some protection from wind-blown dust and water spray (similar to IEC type IP65)
- B004 open construction: no enclosure - includes automatic transfer switch and controls
- B010 Type 12: Indoor use, some protection from dust (similar to IEC type IP61).
- B025 Type 4X: Stainless steel, indoor or outdoor use, provides some protection from corrosion (similar to IEC Type IP65).

Standards
- ✔ A046 UL 1008/CSA certification
- A080 IBC seismic certification

Control voltage
- ✔ M033 12V, Genset starting voltage
- M034 24V, Genset starting voltage

Control options
- ✔ M032 Elevator signal relay
- ✔ M081 MODBUS RS485 Communication module

Auxiliary relays
- Relays are UL Listed, and factory installed. All relays provide (2) normally closed isolated contacts rated 10A @ 600 VAC. Relay terminals accept (1) 18 gauge to (2) 12-gauge wires per terminal.
- L101 24 VDC coil - installed, not wired (for customer use).
- L102 24 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position.
- L103 24 VDC coil - normal position - relay energized when switch is in source 1 (normal) position
- L201 12 VDC coil installed, not wired (for customer use)
- ✔ L202 12 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position
- ✔ L203 12 VDC coil - normal position - relay energized when switch is in source 1 (normal) position

Optional Cable Lugs
- N032 Lug adapters, compression, ½ stab (1200A only)
- N045 Cable lugs, mechanical, 600 MCM, 4 per pole (1200A only)
- N066 Cable lugs, mechanical, 750 MCM, 4 per pole (1200A only)

Miscellaneous
- C027 Cover - guard
- M003 Terminal block - 30 points (not wired)

Warranty
- ✔ G004 2-years, comprehensive
- G007 5-years, comprehensive
- G014 3-years, comprehensive
- G015 10-years, comprehensive

Shipping
- A051 Packing - export box (800 – 1000 A)

Request for quotation (RFQ)
- Z555 Nonconfigurable spec [ETO]

Accessories
- AC-170 Accessories specification sheet

CODES AND STANDARDS

UL	All switches are UL 1008 Listed with UL 50E Type Rated cabinets and UL Listed CU-AL terminals.	**NEC®**	Suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
NEMA	All switches comply with NEMA ICS 10.	**ISO®**	All switches are designed and manufactured in facilities certified to ISO 9001.
CSA	All switches are certified to CSA C22.2 No. 178.1 switching of electrical energy in emergency or other systems, up to 600 VAC and 4 kA.	**IBC®**	All switches are certified to IBC 2018.
IEEE	All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.	**EMC**	Display controllers meet the following Electromagnetic Compatibility (EMC) standards: ■ EN 61000-6-2 Generic Immunity Standard for the Industrial Environment. ■ EN 61000-6-4 Generic Emission Standard for the Industrial Environment.
NFPA	All switches comply with NFPA 70, 99 and 110 (Level 1).		

For more information, please contact your local Cummins distributor or visit cummins.com

Our energy working for you.™

NAS-6542-EN PD00000511 Rev. 11/21

POWERCOMMAND® 40-01 TRANSFER SWITCH CONTROL

OTEC TRANSFER SWITCHES

DESCRIPTION

The PowerCommand® 40-01 Transfer Switch Control is a sophisticated microprocessor-based control with the basic features you need for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications.

The control human machine interface (HMI) includes a LCD display with tactile-feel soft-switches for easy operation and screen navigation. All data on the control can be viewed by scrolling through screens with a display scroll button. The control displays the current active fault, fault occurrences and time-ordered history of the 10 previous faults with respect to Real Time Clock Stamp and Engine Running Time.

FEATURES

Digital display – The PowerCommand® 40-01 offers a clear back-lit LCD 4-line text display, showing system status, contextual icons and warnings. The display is also equipped with 9 red and green LEDs indicating operational status.

Modbus network communication – Modbus network communications capable. Optional Modbus RTU RS485 connection (1 serial port).

Diagnostics and reporting – Detailed event logging with enhanced fault codes, alert lists, power event history, and diagnostic capability during service events and provides the ability to meet any reporting requirements.

PC & Front Panel Configurations – The modules can be easily configured using the PC software. Selected front panel editing is also available.

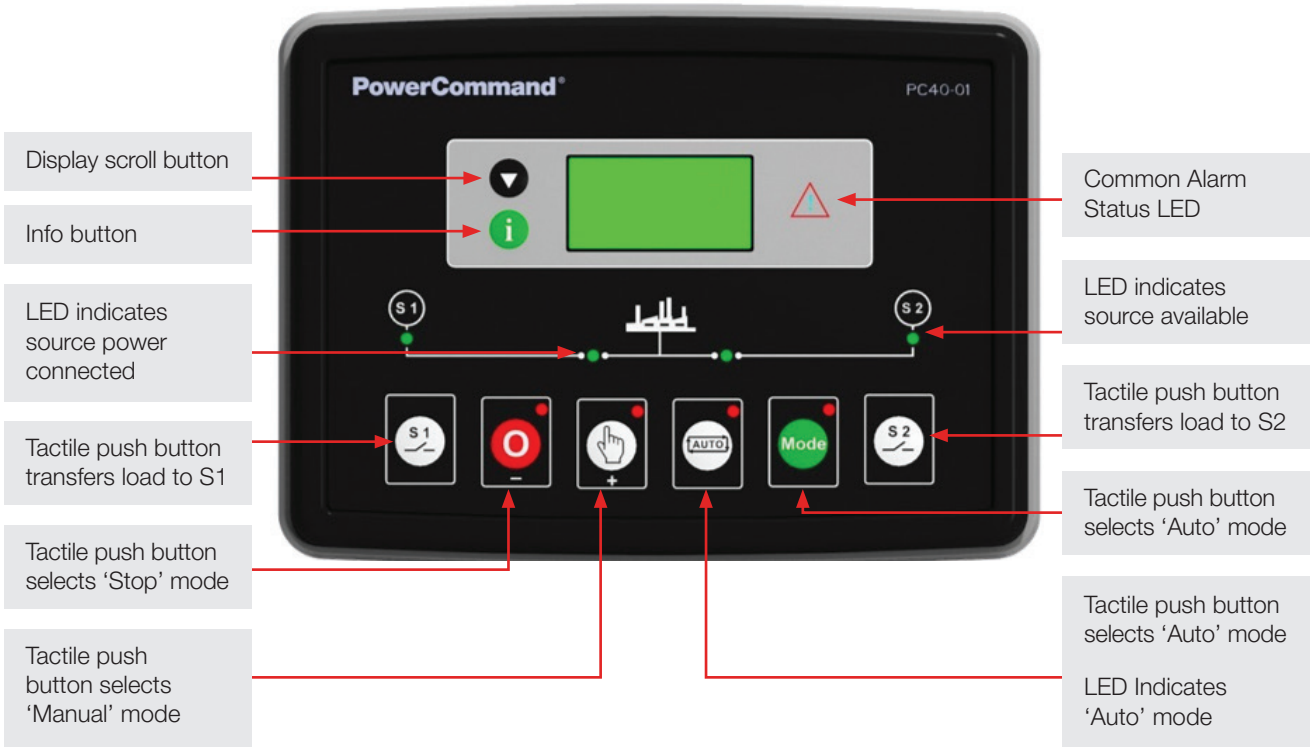
Ease of service and access – Built-in plug-and-play control with minimized point-to-point connections and compatible terminal markings simplify servicing.

Complete product line – Cummins is a single source supplier with full scope of power system solutions, integration and service capability, from parallelingto system level controls, switchgear and remote connectivity.

Warranty and service – Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.

Isometric (ISO) projection: front views

HUMAN MACHINE INTERFACE (HMI) CAPABILITIES



CONTROL FUNCTIONS

TRANSFER INHIBIT

When transfer inhibit external input is active, the control does not automatically transfer the transfer switch to a standby source even when the preferred source fails.

RETRANSFER INHIBIT

When retransfer inhibit external input is active, the control does not automatically retransfer the transfer switch to a preferred source even when the preferred source returns.

REAL TIME CLOCK

This feature is used by the control for fault and event time stamping and as a reference for exerciser schedules and exception schedules.

TEST – REMOTE

Test feature allows the user to automatically test the standby source and the transfer switch. The test command can be issued from the remote source.

The test has following types available:

- Remote Start On Load
- Remote Start Off Load

PREFERRED SOURCE SELECTION

Using this feature the user can swap the priority of the sources which are preferred and standby.

ELEVATOR SIGNAL

This optional feature allows an elevator connected to the system to come to a complete stop before the switch transfers.

EXERCISER SCHEDULER

The Scheduler allows the user to configure pre-set automatic starting and stopping of the Generator as well as stopping the ATS carrying out a transfer (when in Auto mode).

BANK 1 / BANK 2

Each Bank of the Exercise Scheduler is used to give up to 8 scheduled runs per bank, 16 in total. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). Do Not Transfer, Off Load and On Load. Each scheduler bank configured differently either to weekly or monthly based exercises.

SOURCE AVAILABILITY

This feature monitors the frequency and voltage sensors on the preferred and standby sources to determineand declare the availability status of the two sources, irrespective of which source is connected to the load. It declares the states as event codes. Preferred/Standby Available - active inactive.

VOLTAGE SENSING

3-phase sensing on Source 1 and Source 2 (up to 600 Vac with no need for additional PTs). Plant battery voltage monitoring.

ALPHANUMERIC DISPLAY

- S2 Voltage L1-N
- S2 Voltage L-L
- S2 Frequency
- S1 Voltage L1-N
- S1 Voltage L-L
- S1 Frequency
- Battery voltage
- Current alarms with icons
- Event log
- Scheduler
- About

TIME DELAYS

The following adjustable time delays are built into the transfer switch control. External modules to accomplish these delays are not required.

- **Start Delay** (Also known as Time Delay Engine Start, TDES adjustable from 0 to 10 hours)
- **Warming** (Also known as Time Delay Normal to Emergency, TDNE adjustable from 0 to 1 hour)
- **Elevator Delay** (Also known as Time Delay Elevator, TDEL adjustable from 0 to 5 minutes)
- **Non-sync Transfer Time** (Also known as Time Delay Programmed Transition, TDPT adjustable from 0.5 s to 10 minutes)
- **Return Delay** (Also known as Time Delay Emergency to Normal, TDEN adjustable from 0 to 5 hours)
- **Cooling** (Also known as Time Delay Engine Cool-down, TDEC adjustable from 0 to 1 hour)

LED INDICATOR LIGHTS

- Auto mode (RED)
- Auto with manual return to utility mode (RED)
- Test without load (RED)
- Test with load (RED)
- Source 1 available (GREEN)
- Source 2 available (GREEN)
- Source 1 connected to load (GREEN)
- Source 2 connected to load (GREEN)

EVENT LOG

The control displays information on up to 10 events displayed in chronological order, beginning with the most recent event, about either source. The event information shall include the following:

- Failure modes
- Warning
- Tests and exercises
- User-driven inputs (e.g., override, transfer inhibit)

SUPPORTED APPLICATIONS

APPLICATION TYPES

- Utility - Generator Set

COMMUNICATIONS

The PowerCommand® 40-01 Transfer Switch Control features an optional network communication module.

Features include:

- Optional Modbus® RTU RS485 communication module (1 isolated serial port)
- USB port for service tool interface

PROTECTION

PHASE ROTATION SENSING

- Source 1 and Source 2

UNDER-VOLTAGE SENSING

- 3-phase normal, 3-phase emergency
- Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 50Vac to 414Vac.
- Phase to phase voltage range 86Vac to 717Vac.

OVERVOLTAGE SENSING

- 3-phase normal, 3-phase emergency
- Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 52Vac to 416Vac.
- Phase to phase voltage range 90Vac to 720Vac.

OVER/UNDER FREQUENCY SENSING

- Normal and emergency
- Accuracy: ±0.2 Hz
- Frequency range 3.5 – 75 Hz

SYNC CHECK

- For in-phase transfer

ENVIRONMENT	
Operating Temperature Range	Control operates over an ambient temperature range: -30 ºC to 70 ºC.
Storage Temperature Range	The control operates after being exposed to Storage Temperatures in the range of -40 ºC to 85ºC.
Ingress Protection	The front panel is to be IP65.

CODES AND STANDARDS			
c UL us	The PC40-01 control is a UL Recognized Component Marked for United States and Canada.	NFPA	Capable of being used on systems compliant with NFPA 70, 99 and 110 (Level 1).
IEEE	The control is IEEE C37.90.2 certified. Capable of being used on IEEE 446 compliant systems; Recommended Practice for Emergency and Standby Power Systems.	NEMA	Control and display as installed in a transfer switch enclosure comply with NEMA 4X and IP65 at the transfer switch level - if the transfer switch enclosure is also NEMA 4X & IP65 compliant.
RoHS	The control is RoHS compliant.	**NEC®**	Capable of being used on systems suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
CE	Fulfills the requirements of relevant European product directives.	**LVD**	The unit is designed to comply with European directive 72/23/EEC by complying with harmonized European safety standard BS EN 60950.
EMC	The control is tested to meet the following CE Electromagnetic Compatibility (EMC) standards for EN 61000 series (electromagnetic compatibility): EN 61000-6-2 Generic Immunity Standard EN 61000-6-4 Generic Emissions		

For more information, please contact your local Cummins distributor or visit cummins.com

Our energy working for you.™

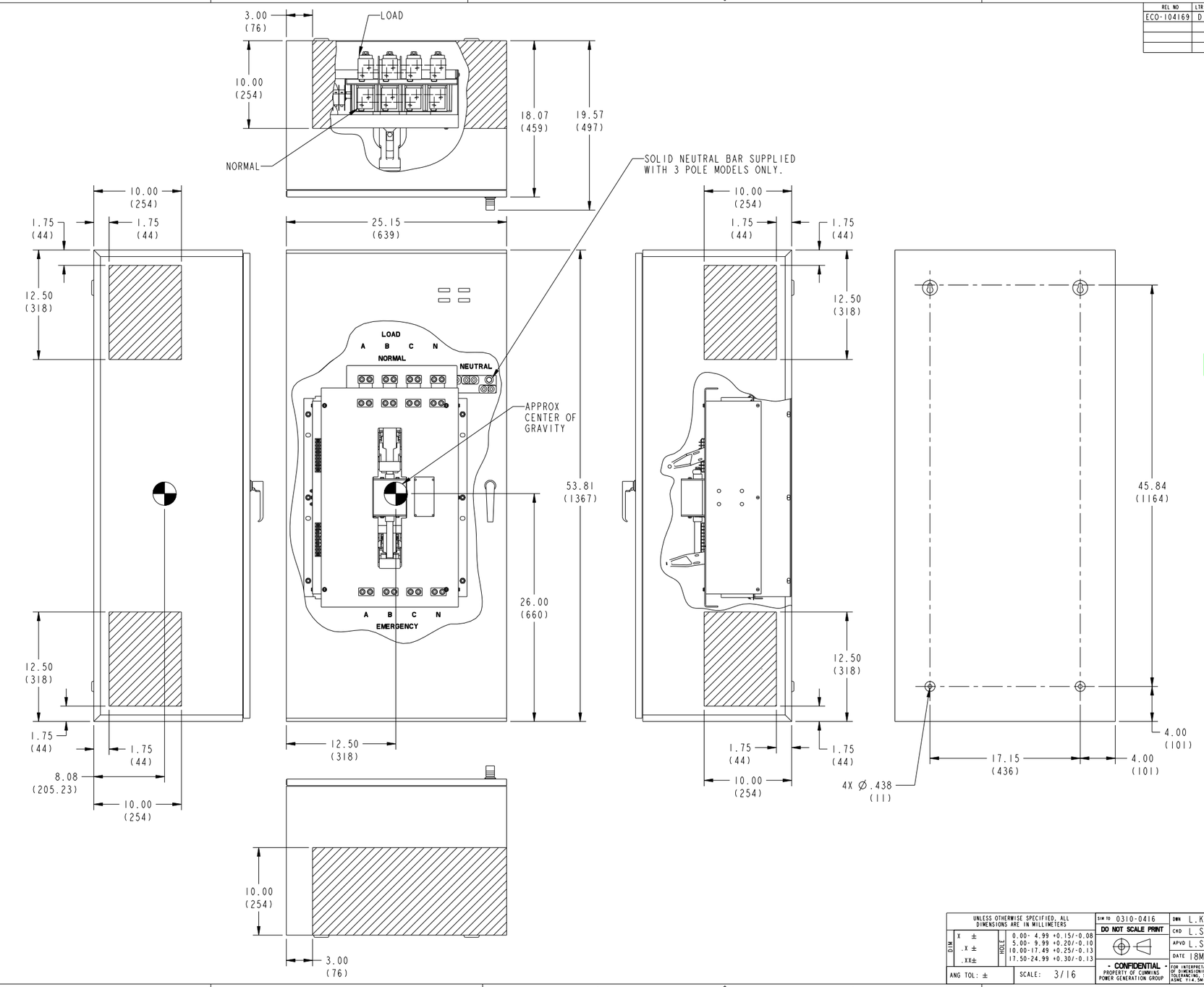
Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

cummins.com

Bulletin XXXXXXX Produced in U.S.A. Rev. 10/21

Pro/ENGINEER

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-104169	D	1	REDRAWN IN PRO-E WITH CHANGES	NVB	LJY	L.SMITH	23DEC11
		2	ZONE B2, REVISED NOTE 7	NVB	LJY	L.SMITH	23DEC11
		3	ZONE B2, REVISED NOTE 8, SEE ECO	NVB	LJY	L.SMITH	23DEC11



NOTES:

1. UL TYPE 1 ENCLOSURE
2. APPROX. WEIGHT: 225 LBS
   MASS: 102 kg
3. DIMENSIONS IN ( ) ARE MILLIMETRES.
4. LUG CAPACITY: 300, 400 AMP
   (QUANTITY 1 WIRE) 3/0-600 (95-300) MCM CU-AL
   (QUANTITY 2 WIRES) 3/0-250 (25-120) MCM CU-AL
   LUG CAPACITY: 600 AMP
   (QUANTITY 2 WIRES) 250-500 (120-240) MCM CU-AL.
5. USE SEPARATE CONDUITS FOR CONTROL WIRING AND POWER WIRING. DO NOT COMBINE.
6. SHADED AREA INDICATES WIRING AND CABLE ENTRANCE AREA DO NOT INSTALL OUTSIDE OF SHADED AREA.
7. WIRE BENDING SPACE CONFORMS TO NATIONAL ELECTRICAL CODE (NFPA70).
8. REFER TO THE NATIONAL ELECTRICAL CODE FOR MINIMUM CLEAR SPACE IN FRONT OF THIS ENCLOSURE.
9. 4 POLE SWITCHED NEUTRAL TRANSFER SWITCH SHOWN. A SOLID NEUTRAL BAR IS PROVIDED WITH 3 POLE TRANSFER SWITCHES.

3 ~~AND 4~~ POLE

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM: X ± / .X ± / .XX±

HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13

ANG TOL: ±

SCALE: 3/16

SIM TO 0310-0416

DO NOT SCALE PRINT

- CONFIDENTIAL -
PROPERTY OF CUMMINS POWER GENERATION GROUP

DRN L.KAPLAN
CKD L.SMITH
APVD L.SMITH
DATE 18MAY99

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994

FIRST USED ON OTPC 300-600A

SITE CODE PGF

CUMMINS POWER GENERATION

OUTLINE-CONTROL BOX

DWG SIZE D | 0310_1307 | SHEET 1 of 1 | DWG REV D

Drawing Name: 0310-1307 Revision: D
Part Name: 0310-1307 Revision: D
Sheet 1 of 2

Section III

Specification Sheet

Battery Charger-6 Amp

A045D925 60Hz/50Hz

Description

Cummins® fully automatic battery chargers are designed to both recharge your batteries, and extend your battery's life in applications where it is stored for long periods of time. This charger can handle poor power quality, exposure to extreme weather and rough handling.

To maximize battery life, a 3-stage charging cycle is implemented. The three charging stages are bulk stage, absorption stage and maintenance stage. During the bulk stage, the charger uses its full amp output to do the heaviest charging, quickly bringing your battery to about 75% of capacity. In the absorption stage, the current slows, adjusting for maximum charging efficiency while it gently tops off the battery to about 98% of capacity.

During the maintenance stage, a lower, closely-regulated, constant voltage is applied to maintain full charge and prevent discharge.

Unlike some "trickle chargers," the float charger won't apply more current than necessary to maintain full charge. Batteries can be connected indefinitely, without harm; in fact, the float charge extends battery life.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Lightweight and Silent – Lighter than transformer types, completely silent but still provides full output when overloaded outlets drop AC voltage below the normal 115V.

Monitoring – Status LED indicators are provided to show the condition or charging status of the battery. When the red LED is on, it indicates that the battery is discharged and is recharging at the 'BULK' rate. When both the red and green LEDs are on, the battery is charging at the 'midrange' rate. When the green LED is on, the battery is 90% charged and ready for use.

Construction – Made using epoxy-potted cases making it the ultimate in durability, completely waterproof and able to withstand numerous caustic chemicals and gases, as well as being shockproof.

Fault Indication – The charger senses and indicates the following fault conditions: Defective or damaged cells, under-voltage at the battery, battery drawing more current than charger can replace, loss of power or extremely low AC voltage at the charger, other battery fault conditions and charger failure.

Compatibility – Works with Sealed Lead Acid (SLA), Absorbed Glass Mat (AGM) and Gel type batteries.

Low Electromagnetic and Radio

Frequency Interference – This product meets FCC class B for conducted and radiated emissions.

Listed – This product is UL listed according to the UL 1236 Standard.

Warranty – This product has a two year warranty

Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12 VDC
	Float voltage – 12 V batteries	13.0-13.6 VDC at 0-2 amps
	Maximum output current	6 A @ 12 VDC nom
Input:	Voltage AC	115, 208, 240 ±10%, 90-135
	Frequency	60 Hz ±5%
Battery:	Maximum battery size	150 Amp Hours
	Maximum recharge time	20 hours
Approximate net weight		4 lbs. (1.81 Kg)
Approximate dimensions: height x width x depth-in(mm)		2.25 x 6.4 x 3.5 (57 x 162 x 89)
Ambient temperature operation: At full rated output		40°F to 158 °F (-40 °C to 70 °C)

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

Warning: For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

NAAC-5943-EN / A059R693 (03/19)

Section IV

Our energy working for you.™

Cummins Power Generation

Limited Warranty

Commercial Generating Set

This limited warranty applies to all Cummins Power Generation® branded commercial generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date† is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. See table for details.

Continuous Power (COP) is defined as being the maximum power which the generating set is capable of delivering continuously whilst supplying a constant electrical load when operated for an unlimited number of hours per year. No overload capability is available for this rating.

Prime Power (PRP) is defined as being the maximum power which a generating set is capable of delivering continuously whilst supplying a variable electrical load when operated for an unlimited number of hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. For applications requiring permissible average output higher than stated, a COP rating should be used.

Limited-Time Running Power (LTP) is defined as the maximum power available, under the agreed operating conditions, for which the generating set is capable of delivering for up to 500 hours of operation per year.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 500 hours of operation per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Environmental Protection Agency – Stationary Emergency (EPA-SE) is defined as being the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generator set is capable of delivering in the event of a utility power outage or under test conditions and used in strict accordance with the EPA NSPS for stationary engines, 40 CFR part 60, subparts IIII and JJJJ, where a reliable utility must be present. The permissible average power output over 24 hours of operation shall not exceed 70% of the EPA-SE.

Data Center Continuous (DCC) is defined as the maximum power which the generator is capable of delivering continuously to a constant or varying electrical load for unlimited hours in a data center application.

Base Warranty Coverage Duration
(Whichever occurs first)

Rating	Months	Max. Hours
COP	12	Unlimited
PRP	12	Unlimited
LTP	12	500 hrs
ESP	24	1000 hrs
EPA-SE	24	Unlimited
DCC	24	Unlimited

† Warranty start date for designated rental and oil and gas model Products is determined to be date of receipt of Product by the end customer.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Inappropriate use of an EPA-SE application generator set relative to EPA's standards.
- Normal wear and tear.
- Improper and/or unauthorized installation.
- Negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.

A "Data center" is defined as a dedicated facility that house computers and associated equipment for data storage and data handling.

Reliable utility is defined as utility power without routine or regularly scheduled black-outs.

Please contact your local Cummins Power Generation® Distributor for clarification concerning these limitations.

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

Extended Warranty:

Cummins Power Generation® offers several levels of Extended Warranty Coverage. Please contact your local Cummins Power Generation ® Distributor for details.
www.power.cummins.com

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited warranty shall be enforced to the maximum extent permitted by applicable law. This limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____
Product Serial Number:_____
Date in Service:_____

Warranty Statement

Transfer Switch Extended Warranty

English
Original Instructions
1-2017
1118-0003 (Issue 5)

Limited 2 Year Comprehensive Extended Warranty – G004

Transfer Switch and Paralleling Systems

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded Transfer Switches, Paralleling Systems and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 2 years from warranty start date.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.

Limitations Continued:

- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode
- Owner or operator abuse or neglect such as: operation without adequate coolant or

lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.

- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

www.cumminspower.com

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

REQUIREMENTS FOR GENERATOR STARTUP

IMPORTANT MESSAGE: ***(This document must be completed, signed and returned prior to the scheduled startup)***
The following must be completed by the individual responsible for the installation of the Generator at the JobSite. All Systems must be installed in accordance with Cummins Power Generation published installation recommendations and Project Specific Drawings

Diesel Generators

☐ There is sufficient fuel (winterized fuel if applicable) in the sub-base tank for start-up and testing.
Note: The Owner/Contractor is responsible for supplying fuel: "#2 Diesel, low-sulfur/ultra-low sulfur" is required

LPG or Natural Gas Generators

☐ Gas pressure meets Cummins specifications – please refer to the submittal documents for proper fuel pressure & volume
☐ The Gas Company has turned on the gas and there is fuel to the generator.
☐ ***If required by local authority***, a signed Natural Gas/Propane/LPG Fuel System Certificate indicating compliance to all applicable authorities rules and regulations pertaining to the location of the equipment.

General Requirements *(check all that apply)*

Are the following correctly installed, mounted, wired, connected, wrapped, insulated, and operating (as applicable)?

☐ Exhaust system
☐ Room lighting
☐ Louver motors and cooling fans
☐ Transfer Switch(es)
☐ Battery Charger connected to building AC power
☐ Engine Heater AC but not energized
☐ Fuel solenoid valve, strainer and PRV
☐ Exercise Clock ready to be programmed
☐ All Alarms
☐ Carburetor Heater & Outlet
☐ DC control wiring & AC feeds in separate conduit between Genset & ATS
☐ Radiator Exhaust Ducting: Air In/Out Openings meet specs & are clear of debris
☐ All required inspections have been completed (EG: Local Authorities, Natural Gas, Plumbing, Electrical, etc.)
☐ All interconnect wiring between generator, transfer switch and remote annunciator
Note: Service Technician will not pull wires or run conduit for the annunciator (if applicable)

Miscellaneous

1) How close can our Technician get a vehicle and trailer to the generator for Load Bank testing? _____ **Ft/Yds**
2) Does the Genset have a remote radiator? ☐ Yes ☐ No (if **Yes**, please attach details of location)
3) Is the Genset: ☐ on roof ☐ inside ☐ outside ☐ in the grounds of the property
4) Is the Room/Site swept and free of all debris? ☐ Yes
5) Will Contractor/Owner personnel be available for instruction? ☐ Yes
6) Accessibility to elevators, if required? ☐ Yes
7) **Is equipment connected to normal utility power?** ☐ Yes
8) **Can transfer switch be tested at time of generator startup?** **(Note: There will be a power interruption)** ☐ Yes

****

Please note (1): Always refer to manuals shipped with the equipment for proper installation information.

Please note (2): The Cummins Sales and Service Technician will supply lube, oil, anti-freeze and starting battery.

Please note (3): Adjustments after the initial Start-Up are not included in the Start-Up and are not covered by Warranty.

Please note (4): The Contractor/Owner understands that the above items must be completed prior to start up. Should additional trips be needed resulting from Contractor/Owner not completing the above requirements, or if our Service Technician assists in completing any of the tie-ins, the Contractor/Owner will be responsible for the additional labor and mileage incurred. Load Bank Tests will not be conducted during inclement weather. Additional trips will be at contractor/owners' expense.

****

REQUIREMENTS FOR TRANSFER SWITCH STARTUP

IMPORTANT MESSAGE:
The following must be completed by the individual responsible for the installation of the Transfer Switch at the JobSite. All Systems must be installed in accordance with Cummins Power Generation published installation recommendations and Project Specific Drawings

General Requirements
NOTE: ***Cummins service technician(s) will not be responsible for pulling or terminating wires.***

Please check all boxes to confirm complete:
- ☐ All switch(es) meet specs as requested and have been inspected prior to applying AC power.
- ☐ DC control wiring & AC feeds in separate conduit between Genset & ATS
- ☐ All switch(es) are clear of debris.
- ☐ All transfer switch alarms have been terminated as indicated.
- ☐ Battery Charger connected to building AC power
- ☐ All interconnect wiring between generator, transfer switch and remote annunciator are completed.
- ☐ Exercise Clock is ready to be programmed (if applicable)

Miscellaneous
1) How close can our Technician get a vehicle and trailer to the ATS for testing/startup? _____ **Ft/Yds**

2) ATS(s) location: ☐ on roof ☐ inside ☐ outside ☐ below ground level

3) Will Contractor/Owner or necessary personnel be available for instruction? ☐ Yes ☐ No

****

Please note (1): Always refer to manuals shipped with the equipment for proper installation information.

Please note (2): Adjustments after the initial Start-Up are not included in the Start-Up and are not covered by Warranty.

Please note (3): The Contractor/Owner understands that the above items must be completed prior to start up. Should additional trips be needed resulting from Contractor/Owner not completing the above requirements, or if our Service Technician assists in completing any of the tie-ins, the Contractor/Owner will be responsible for the additional labor and mileage incurred. Load Bank Tests will not be conducted during inclement weather. Additional trips will be at contractor/owners' expense.

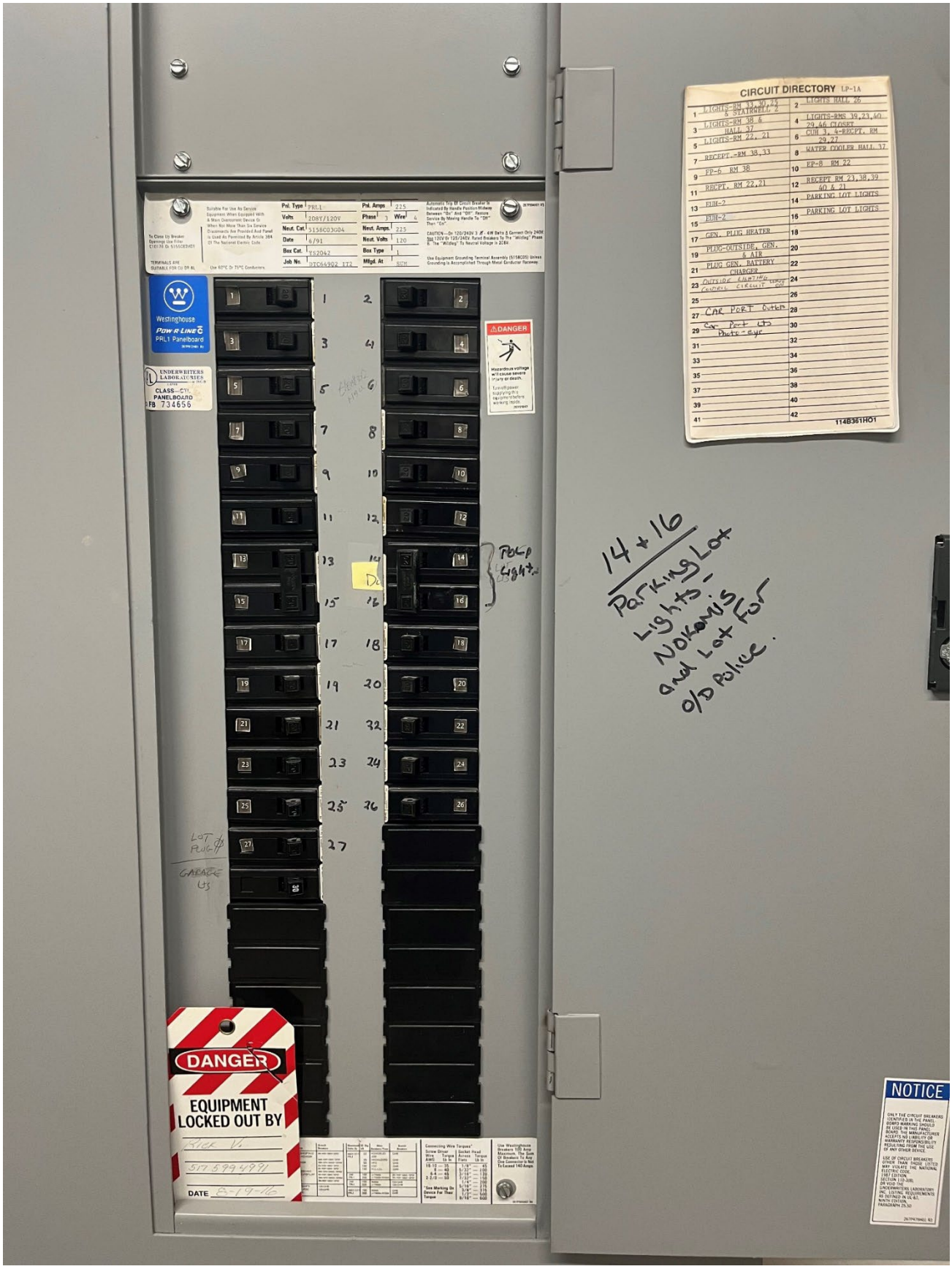
****

PSU-002

APPENDIX B

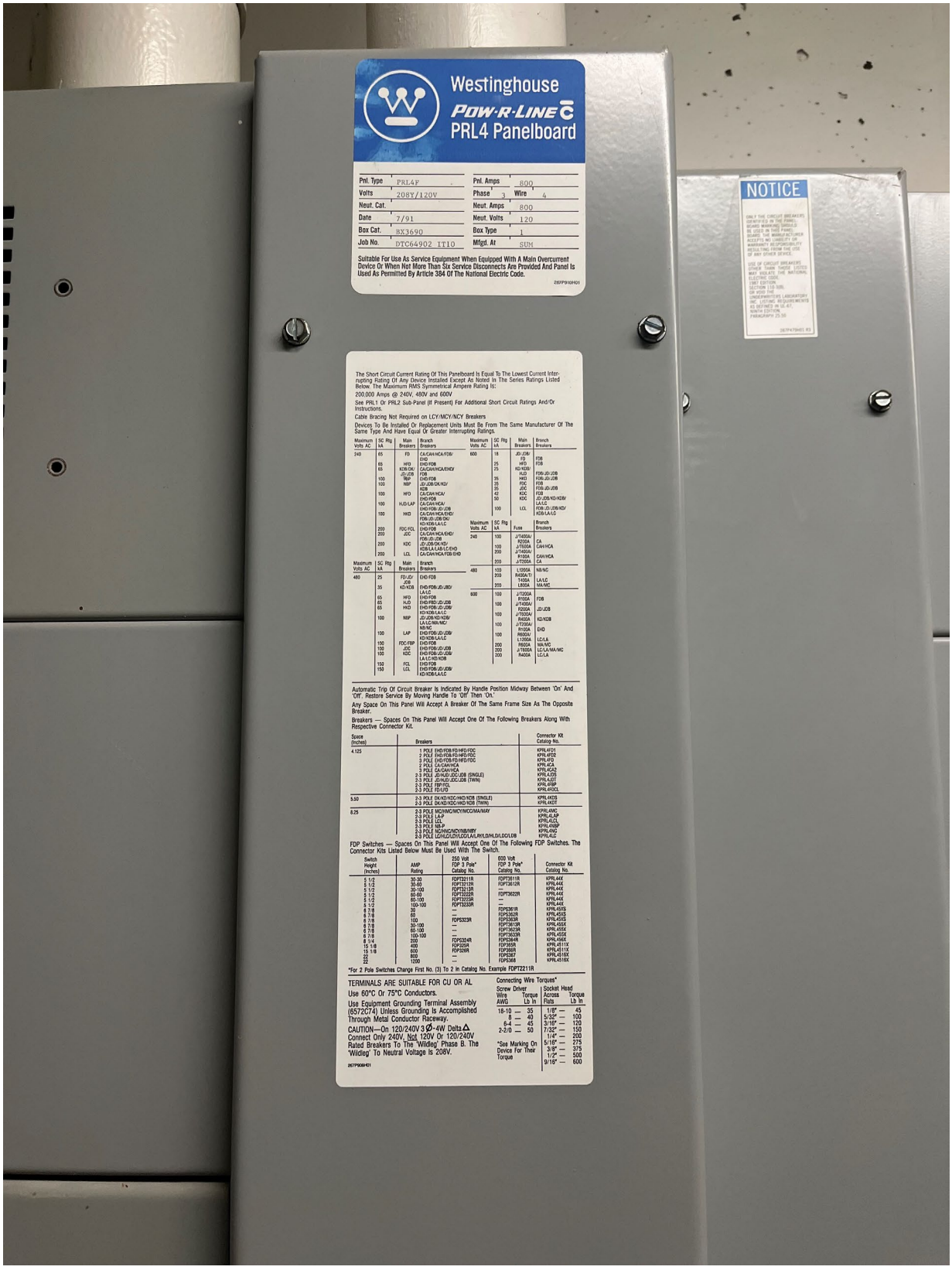
Left Electrical Panel **Right Electrical Panel**

LEFT ELECTRICAL PANEL



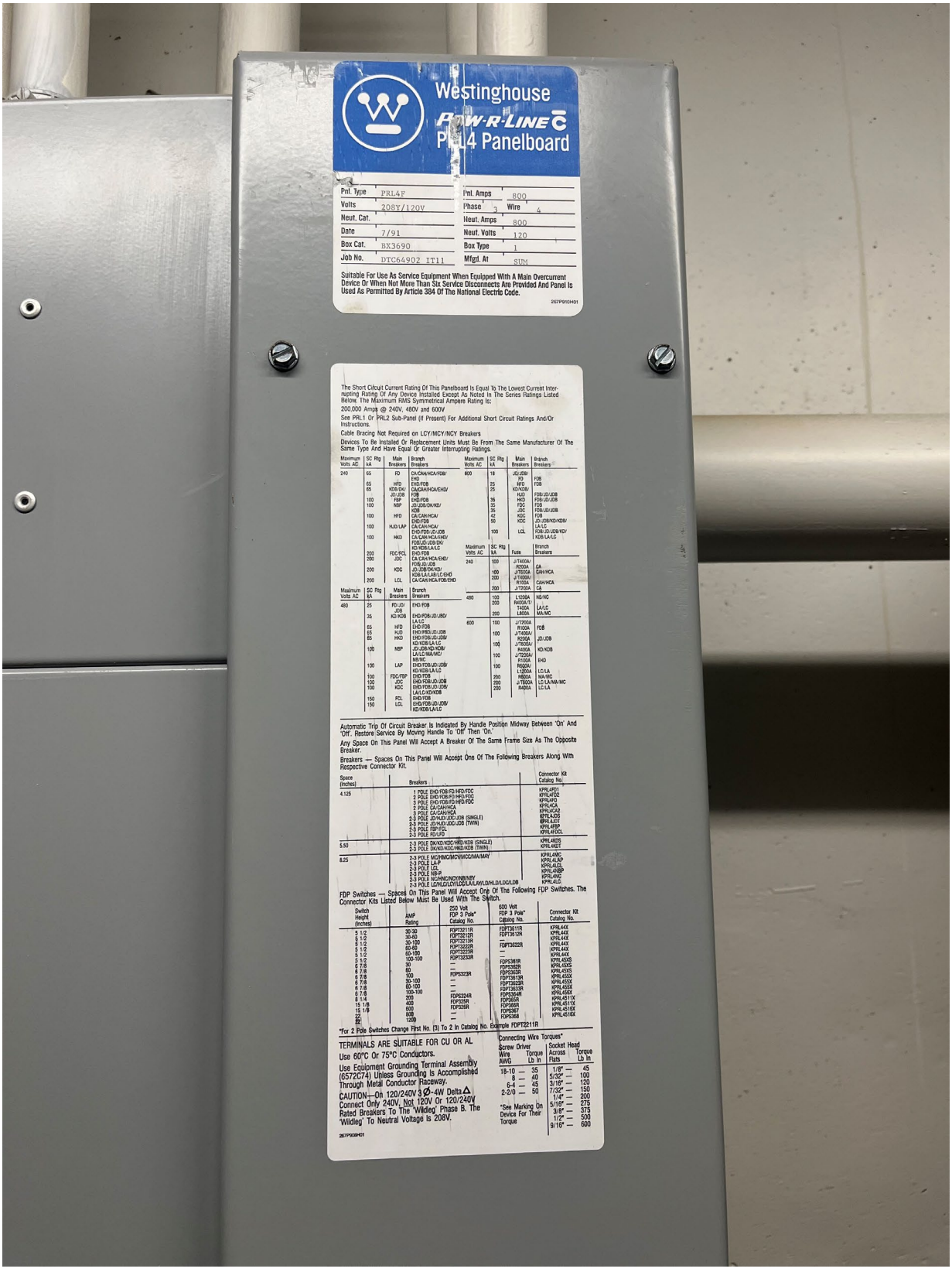
RIGHT ELECTRICAL PANEL

LEFT PANELBOARD



LEFT PANELBOARD

RIGHT PANELBOARD



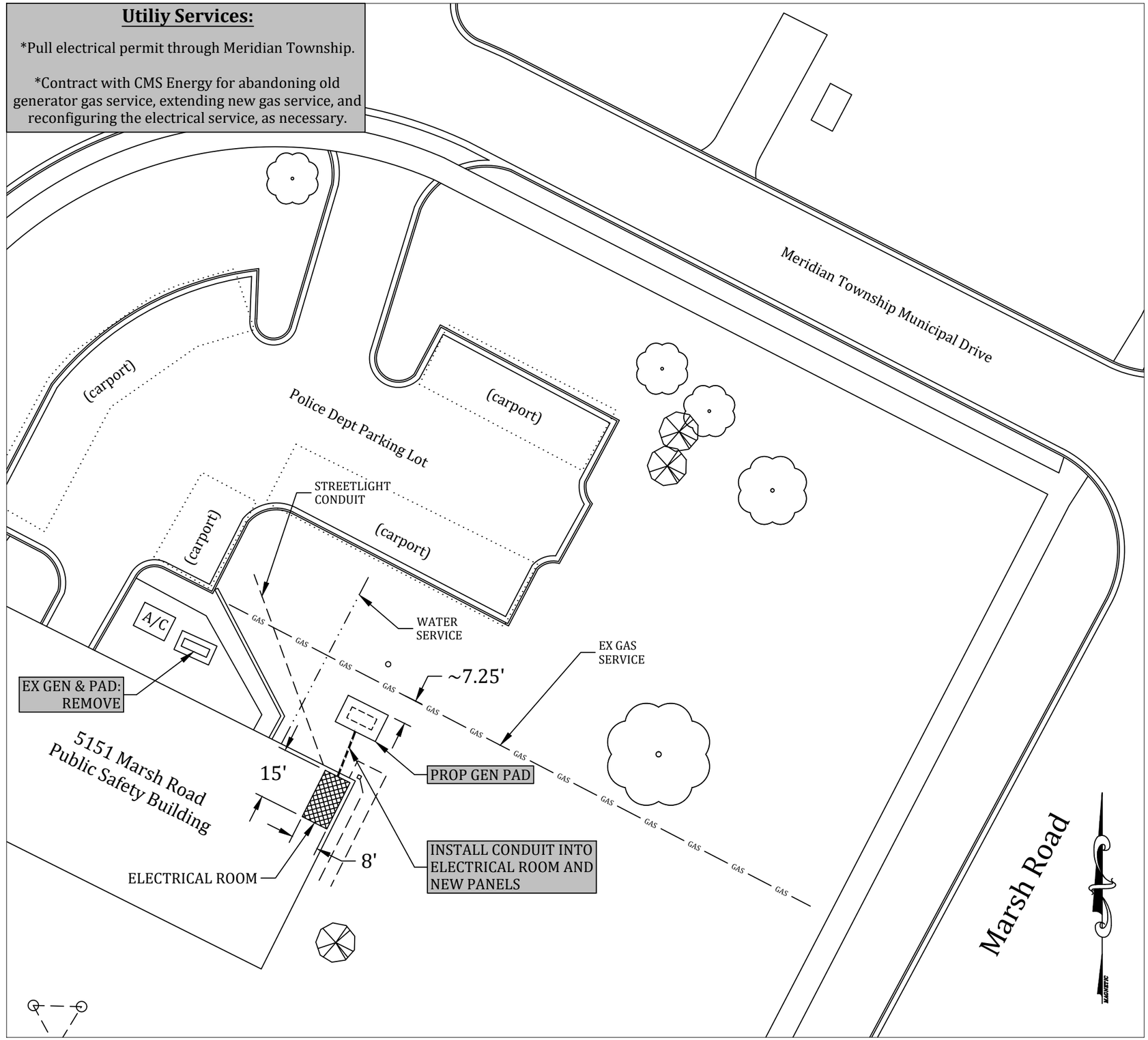
RIGHT PANELBOARD

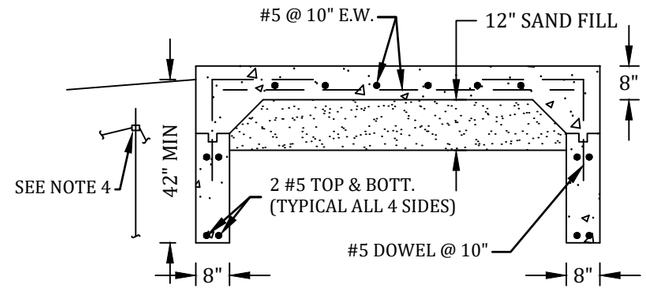
APPENDIX C

Utiliy Services:

*Pull electrical permit through Meridian Township.

*Contract with CMS Energy for abandoning old generator gas service, extending new gas service, and reconfiguring the electrical service, as necessary.





PAD NOTES:

1. ALL CONCRETE SHALL ACHIEVE 4000 PSI AT 28 DAYS AND SHALL BE AIR ENTRAINED. CHAMFER EXPOSED EDGES 3/4".
2. PROVIDE OPENINGS FOR GENERATOR CONDUITS AS REQUIRED.
3. ADJUST PAD DIMENSIONS FOR EQUIPMENT SUPPLIED. PAD SHALL BE 24 INCHES LONGER AND WIDER THAN EQUIPMENT SUPPLIED OR AS DIMENSIONED ON THE PLANS, WHICHEVER IS GREATER.
4. FURNISH AND INSTALL 4 - 3/4"x10' GROUND RODS IN UNDISTURBED SOIL NEAR PAD CORNERS. INTERCONNECT WITH NO. 4/0 BARE COPPER GROUND CABLE. CONNECT TO GENERATOR GROUND LUG AND TO MAIN GROUND BUS WITH NO. 4/0 CABLE.

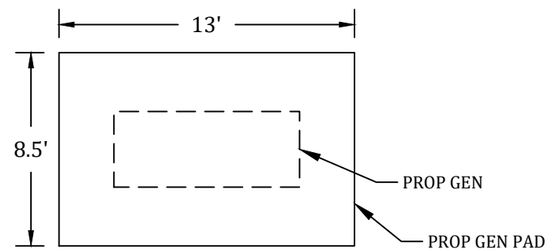
* GENERATOR PAD DETAIL
SCALE: NTS

Proposed Station Specs:

Generator - 100kW

ATS - 400A

Fuel Operating Pressure - 6.0 to 13.0 In. H_2O



Concrete Pad Dimensions

Meridian Charter Township
Ingham County, Michigan
Facilities

Public Safety Building
5151 Marsh

REVISIONS:		
DATE:	BY:	COMMENTS:
01.25.23	NN	Plan for Bid

SCALE: 1" = 30'
PAGE: Apx C
FILE:
DRAWN BY: NN 01.25.23
CHECKED BY: