Size: 2.33in x 1.48in x 0.51in
(59.2mm x 37.6mm x 13mm)

FEATURES

- Wide Input Voltage
- Adjustable Input Starting (Under Voltage) Voltage
- High Efficiency
- RoHS Compliant
- ¼ Brick Package
- Industry Standard Pin Out
- Open Frame Package
- Non-Isolated & Regulated Output
- Input Under Voltage Protection
- Short Circuit and Over Current Protection
- EN62368 Approval

DESCRIPTION

The DCRB10A series of DC/DC converters offers up to 240 watts of output power in a ¼ brick package with industry standard pin-out. This series consists of non-isolated and regulated single output models with a wide input voltage range. Features of this series include short circuit and over current protection, input under voltage protection, and adjustable input starting voltage. This series has EN62368 safety approvals and is RoHS compliant.

MODEL SELECTION TABLE

Model Number	Input Voltage		Output Voltage	Max. Output Current	Efficiency		Certification	Max. Capacitive Load	Typ. Ripple & Noise	Output Power
	Nominal (Range)	Max.(1)			Min.	Typ.				
DCRB10A-48S24	48VDC (30~75VDC)	80VDC	24VDC	10A	94%	97%	CE	3300μF	150mVp-p	240W
DCRB10A-48S12	48VDC (16~75VDC)		12VDC	10A	92%	95%		5500μF		120W

SPECIFICATIONS

All specifications are based on 25°C, Humidity <75%, Nominal Input Voltage, and Rated Output Load unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
INPUT SPECIFICATIONS							
Input Voltage Range	3.3VDC Nominal Input				See Table		
Input Current	Nominal Input Voltage	Full Load	DCRB10A-48S24		5208	5320	mA
			DCRB10A-48S12		2660	2718	
		No Load	DCRB10A-48S24		35	80	mA
			DCRB10A-48S12		35	80	
Surge Voltage (1 sec. max.)				-0.7		80	VDC
Reflected Ripple Current	Nominal Input Voltage				200		mA
Starting Voltage	DCRB10A-48S24					30	VDC
	DCRB10A-48S12					16	
Under Voltage Protection	DCRB10A-48S24			25	27		VDC
	DCRB10A-48S12			12.5	14		
Adjustable Input Starting (Under-Voltage) Voltage	Refer to Design Reference for details	DCRB10A-48S24		30		75	VDC
		DCRB10A-48S12		16		75	
Input Filter				Capacitance Filter			
Ctrl(2)	Module On			Ctrl Pin Open or Pulled High (1.5-12VDC)			
	Module Off			Ctrl Pin Pulled Low to GND (0-0.8VDC)			
	Input Current When Off				2	10	mA
Hot Plug				Unavailable			
OUTPUT SPECIFICATIONS							
Output Voltage					See Table		
Voltage Accuracy	0%-100% Load				±1	±3	%
Linear Regulation	Full load, input voltage is from low to high				±0.1	±0.5	%
Load Regulation	5%-100% Load				±0.3	±2	%
Output Power					See Table		
Output Current					See Table		
Maximum Capacitive Load	Tested at input voltage range and full load				See Table		
Ripple & Noise (3)	20MHz Bandwidth				150	220	mVp-p
Temperature Coefficient	Full Load					±0.03	%/°C
Transient Recovery Time	25% Load Step Change				200	500	μS
Transient Response Deviation	25% Load Step Change				±4	±5	%
PROTECTION							
Short Circuit Protection	Input Voltage Range			Hiccup, Continuous, Self-Recovery			
Over Current Protection	Input Voltage Range			110	130	190	%Io

SPECIFICATIONS

All specifications are based on 25°C, Humidity <75%, Nominal Input Voltage, and Rated Output Load unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS			Min	Typ	Max	Unit
ENVIRONMENTAL SPECIFICATIONS							
Operating Temperature	Derating when operating temperature up to 85ºC			-40		85	ºC
Storage Temperature				-55		125	ºC
Storage Humidity	Non-Condensing			5		95	%RH
Pin Welding Resistance Temperature	Wave-Soldering, 10s					260	°C
Vibration				10-150Hz, 5g, 0.75mm, 90 Min. along X, Y, and Z			
Trim				90		110	%Vo
Sense	Refer to Remote Sense Application for details					105	%Vo
MTBF	MIL-HDFK-217F@25ºC			1000			K Hours
GENERAL SPECIFICATIONS							
Efficiency	@Full Load			See Table			
Switching Frequency	PWM Mode		DCRB10A-48S24		250		KHz
			DCRB10A-48S12		200		
PHYSICAL SPECIFICATIONS							
Weight	SIP Package			1.16oz (33g)			
Dimensions (L x W x H)				2.33in x 1.48in x 0.51in (59.2mm x 37.6mm x 13mm)			
Cooling				Natural convection or forced convection			
SAFETY CHARACTERISTICS							
Safety Approvals			EN62368				
EMI	CE		CISPR32/EN55032(4)				Class B
	RE		CISPR32/EN55032(4)				Class B
EMS	ESD	IEC/EN61000-4-2	Contact ±6kV				Perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m				Perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV(4)				Perf. Criteria A
	Surge	IEC/EN61000-4-5	±2kV(4)				Perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s				Perf. Criteria A

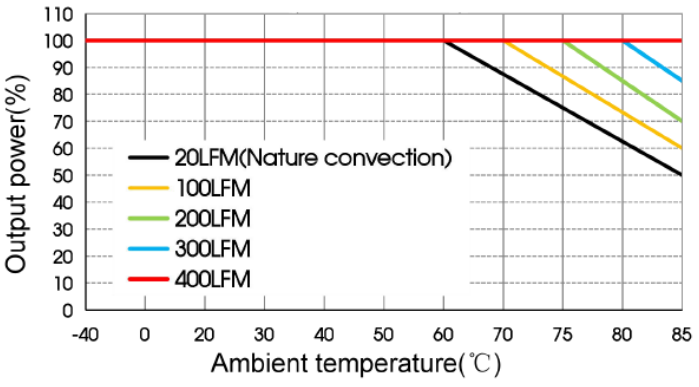
NOTES

1. Exceeding maximum input voltage may cause permanent damage.
2. The voltage of the Ctrl pin is relative to input pin GND.
3. Ripple & noise are measured by “parallel cable” method. Contact factory for more information.
4. See Fig. 2 for recommended circuit.
5. Product customization available.
6. Product should be classified according to ISO14001 and related environmental laws and regulations and should be handled by qualified units.

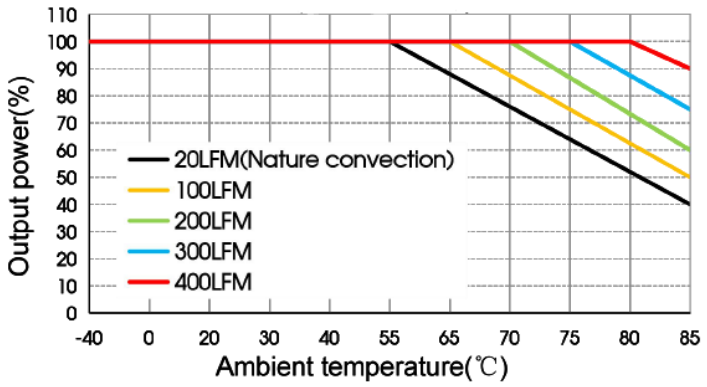
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVE

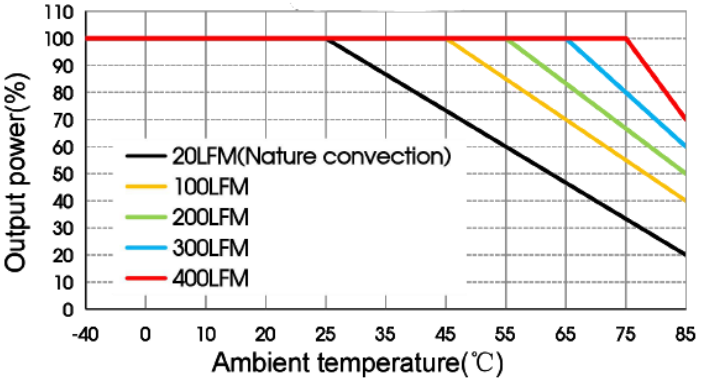
DCRB10A-48S24 Temperature Derating Curves (30V≤Vin≤48V)



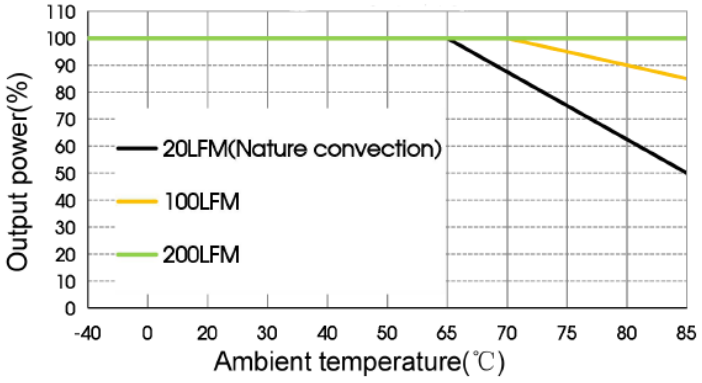
DCRB10A-48S24 Temperature Derating Curves (48V≤Vin≤55V)



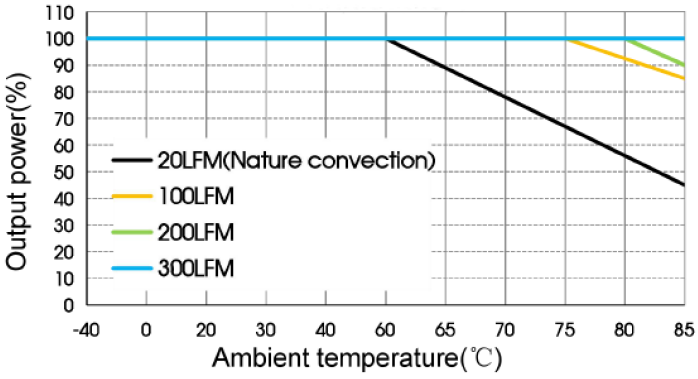
DCRB10A-48S24 Temperature Derating Curves (55V≤Vin≤75V)



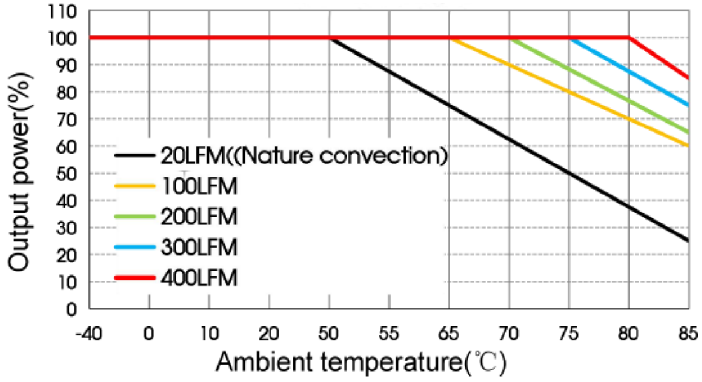
DCRB10A-48S12 Temperature Derating Curves (16V≤Vin≤48V)



DCRB10A-48S12 Temperature Derating Curves (48V≤Vin≤55V)



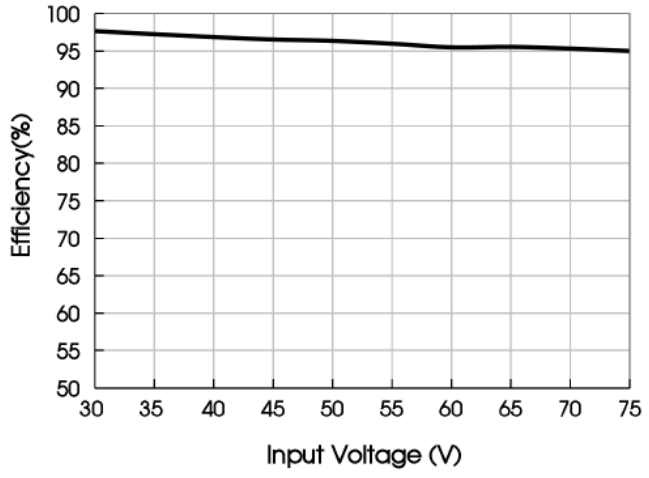
DCRB10A-48S12 Temperature Derating Curves (55V≤Vin≤75V)



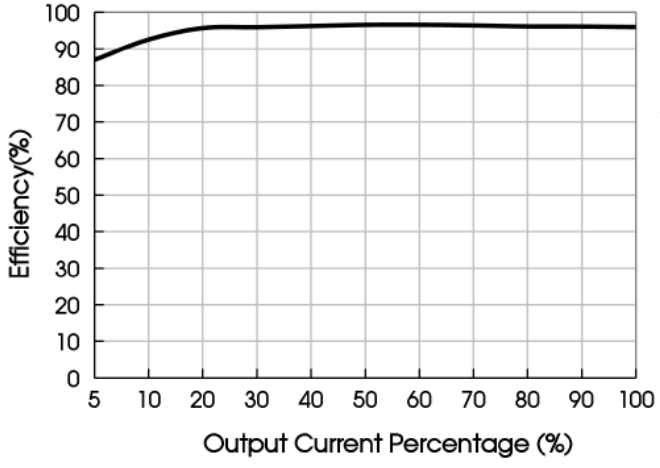
Notes:
Product application thermal design should be referred to the recommended PCB layout and recommended heat dissipation structure. Contact factory or more information.

EFFICIENCY CURVES

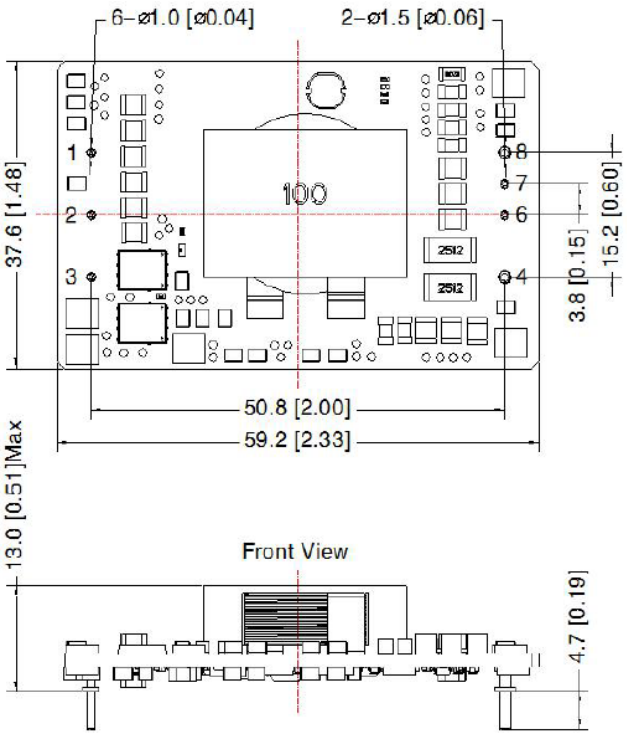
Efficiency vs Input Voltage DCRB10A-48S24

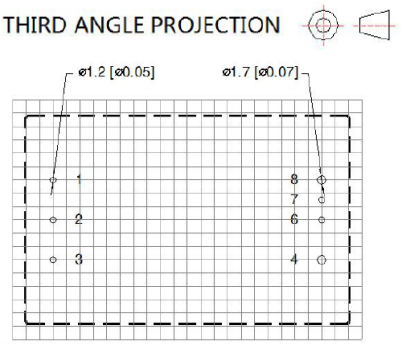


Efficiency vs Output Load (Vin=48V) DCRB10A-48S24



MECHANICAL DRAWINGS





Note: Grid 2.54*2.54mm

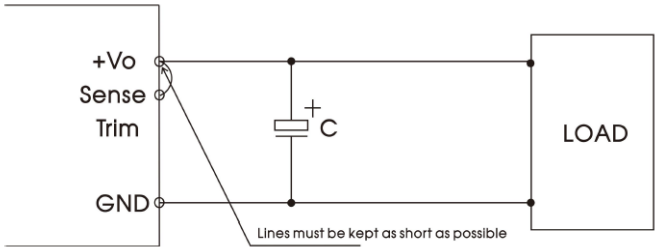
Pin-Out

Pin	Function	Pin	Function
1	+Vin	4	0V
2	Ctrl	6	Trim
3	-Vin	7	Sense+
		8	+Vo

Notes:
Unit: mm[inch]
Pin 1,2,3,6,7 diameter: 1.0[0.04]
Pin 4,8 diameter: 1.5[0.06]
Pin diameter tolerances: ±0.10 [±0.004]
General Tolerances: ±0.5 [±0.020]
Device layout is for reference only, specific object shall prevail

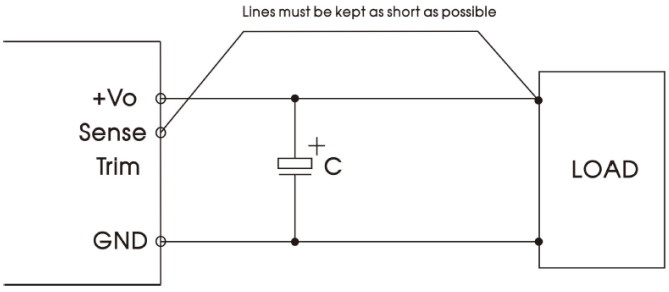
REMOTE SENSE APPLICATION

1. Remote Sense Connection if Not Used



Notes:
1. If the sense function is not used for remote regulation the user must connect the Sense to +Vo at the DC-DC converter pins and will compensate for voltage drop across pins only
2. The connections between Sense and +Vo must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

2. Remote sense connection used for compensation



Notes:
1. Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.
2. We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load in order to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range
3. Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.

DESIGN REFERENCE

1. Typical Application

1. We recommend using the recommended circuit shown in Fig. 1 during product testing and applications, otherwise please ensure that at least a 100μF electrolytic capacitor is connected at the input in order to ensure adequate voltage surge suppression and protection.
2. We recommend increasing the value of Cin and pay attention to the unstable input voltage if the product input side is paralleled with motor drive circuit and/or larger energy transient circuits, to ensure the stability of the input terminal and avoid repeatedly start-up problems due to input voltage lower than undervoltage protection point.
3. We recommend increasing the output capacitance limited to the capacitive load specification and/or increasing the voltage clamping circuit (such as TVS) if the output terminal is an inductive device such as a relay or motor, to ensure adequate voltage surge suppression and protection.
4. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance does not exceed the specified max. capacitive load value of the product.

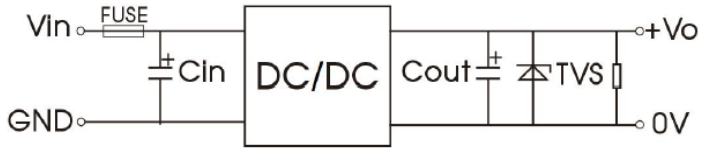


Fig 1

Vout (VDC)	Fuse	Cin(1)	Cout	TVS
12	20A, slow blow	100μF	100μF	SMDJ14A
24				SMDJ28A

1. Please pay attention to the ambient temperature of the product when using an external capacitor, increase the electrolytic capacitor values to at least 1.5 times the original parameter if the ambient temperature is low.

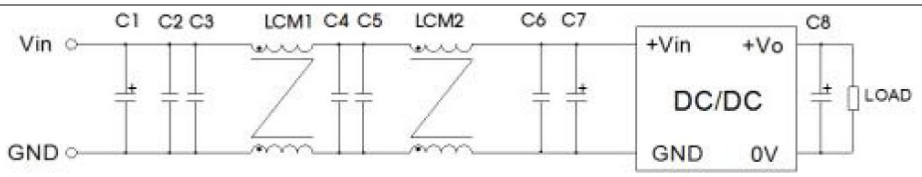
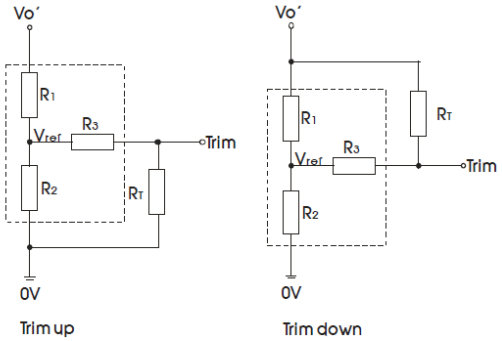


Fig. 2

Components	Recommended Component Value	Components Function
C1	1000μF Electrolytic Capacitor	Meet EFT and Surge
C7	300μF Electrolytic Capacitor	
C1	1000μF Electrolytic Capacitor	Meet CE and RE
C7	330μF Electrolytic Capacitor	
C8	100μF Electrolytic Capacitor	
C2, C3, C4, C5, C6	4.7μF Electrolytic Capacitor	
LCM1, LCM2	47μF Commom Mode Inductor (TN120L T-12.7-7-7.9-CPY)	

2. Trim Function for Output Voltage Adjustment (Open if Unused)



TRIM Resistor Connection (Dashed Line Shows Internal Resistor Network)

Calculation formula of Trim resistance:

up: $R_T = \frac{aR_2}{R_2-a} - R_3$ $\quad a = \frac{Vref}{Vo'-Vref} \cdot R_1$

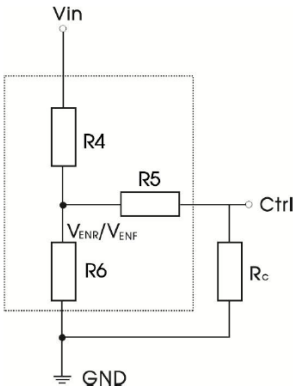
down: $R_T = \frac{aR_1}{R_1-a} - R_3$ $\quad a = \frac{Vo'-Vref}{Vref} \cdot R_2$

R_T= Trim resistor value
a= self-defined parameter
Vo'=desired output voltage (±10% max.)

Vout(VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
12	330	23.48	120	0.8
24	330	11.38	91	0.8

Note: When using the Trim down function, make sure that the RT resistor value is calculated correctly. If the Trim pin is shorted with +Vo, or it's value is too low, then the output voltage Vo would be lower, which may cause the product to fail.

3.Adjustable Input Starting (Under-Voltage) Voltage and Resistor Calculation



Adjustable input Starting (under-voltage) voltage resistor connection
(dashed line shows internal resistor network)

Calculation resistor of adjustable input starting (under-voltage) voltage:

$$Rc=\frac{bR_5}{R_5-b}-R_6 \qquad b=\frac{V_{EN}}{Vin-V_{EN}}\cdot R_4$$

R_C: resistor of adjustable input starting (under-voltage) voltage
B: self-defined parameter
When $V_{EN}=V_{ENR}$, Vin is actual starting voltage required for input
When $V_{EN}=V_{ENF}$, Vin is actual under-voltage required for input

Vout (VDC)	R4 (KΩ)	R5 (KΩ)	R6 (KΩ)	V_{ENR} (V)	V_{ENF} (V)
12	100	8.93	0.1	1.22	1.09
24	100	4.32	0.1	1.22	1.09

4. Products do not support parallel connection of their output.

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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