



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

**APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)**

OFFICE USE ONLY

APPLICATION #: OSP – 0477 – 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: Armstrong International, Inc.

Manufacturer's Technical Representative: Matt Nowak

Mailing Address: 816 Maple Street, Three Rivers, Michigan 49093

Telephone: (269) 279-3323

Email: mnowak@armstronginternational.com

Product Information

Product Name: Armstrong Humidifiers

Product Type: Humidifier

Product Model Number: See Certified Product Table attached

(List all unique product identification numbers and/or part numbers)

General Description: Humidifier systems of different sizes, weights, and function. Seismic enhancements made to the test units and modifications required to address the anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Rigidly mounted to the floor or wall

Applicant Information

Applicant Company Name: Armstrong International, Inc.

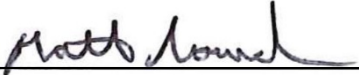
Contact Person: Matt Nowak

Mailing Address: 816 Maple Street, Three Rivers, Michigan 49093

Telephone: (269) 279-3323

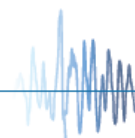
Email: mnowak@armstronginternational.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.

Signature of Applicant:  Date: August 21, 2017

Title: North America Sales Manager Company Name: Armstrong International

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
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California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)

Company Name: Forell/Elsesser Engineers, Inc.

Name: Marco Scanu, SE California License Number: S4454

Mailing Address: 160 Pine St., 6th Flr., San Francisco, CA 94111

Telephone: (415) 837-0700 Email: m.scanu@forell.com

Supports and Attachments Preapproval

- ☐ Supports and attachments are preapproved under OPM-
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
- ☒ Supports and attachments are not preapproved

Certification Method

- ☒ Testing in accordance with: ☒ ICC-ES AC156
- ☐ Other (Please Specify): OSP-0477-10

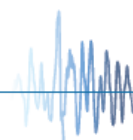
Testing Laboratory

Company Name: Clark Testing

Contact Name: Russell Matich

Mailing Address: 1801 Route 51, Bldg. 8, Jefferson Hills PA, 15025

Telephone: (412) 387-1025 Email: rmatich@clarktesting.com





OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT FACILITIES DEVELOPMENT DIVISION

Seismic Parameters

Design in accordance with ASCE 7-10 Chapter 13: ☒ Yes ☐ No

Design Basis of Equipment or Components (F_p/W_p) = 1.59

S_{DS} (Design spectral response acceleration at short period, g) = 2.12

a_p (In-structure equipment or component amplification factor) = 2.5

R_p (Equipment or component response modification factor) = 6

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0

Equipment or Component Natural Frequencies (Hz) = See attachment, UUT Summary Sheets

Overall dimensions and weight (or range thereof) = See attachment, Certified Products Table

Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15: ☐ Yes ☒ No

Design Basis of Equipment or Components (V/W) = _____

S_{DS} (Design spectral response acceleration at short period, g) = _____

S_{D1} (Design spectral response acceleration at 1 second period, g) = _____

R (Response modification coefficient) = OSP-0477-10

Ω_0 (System overstrength factor) = _____

C_d (Deflection amplification factor) = BY: Ali Sumer

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = DATE: 12/28/2018

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

Tank(s) designed in accordance with ASME BPVC, 2015: ☐ Yes ☒ No

List of Attachments Supporting Special Seismic Certification

☒ Test Report(s) ☐ Drawings ☒ Calculations ☒ Manufacturer's Catalog

☒ Other(s) (Please Specify): Certified Products Table, Certified Subcomponents Table, UUT Summary Sheets

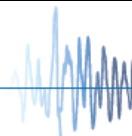
OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022

Signature: [Signature] Date: December 28, 2018

Print Name: Ali Sumer Title: DSE

Special Seismic Certification Valid Up to : S_{DS} (g) = 2.12 z/h = 1.0

Condition of Approval (if applicable): _____



Armstrong - Humidifiers

HC6100/HC6300 (Wall Mounted)											
Power	Voltage	Phase	Water Type	Width	Depth	Height	Weight		Construction Material	Part Number	Testing Status
							Dry	Wet			
3 kW	208 V	1 φ	Tap	21.9 in	22.3 in	32.1 in	128 lbs	230 lbs	Stainless Steel	D5599	UUT1A.1 & UUT1A.2
3 kW	208 V	3 φ	DI							D5580	Interpolated
3 kW	240 V	1 φ	Tap							D5600	Interpolated
3 kW	240 V	3 φ	Tap							D5601	Interpolated
3 kW	240 V	3 φ	DI							D78263	Interpolated
3 kW	400 V	3 φ	Tap							D11406	Interpolated
3 kW	400 V	3 φ	DI							D11410	Interpolated
3 kW	480 V	3 φ	Tap							D5602	Interpolated
3 kW	480 V	3 φ	DI							D28877	Interpolated
3 kW	600 V	3 φ	Tap							D5603	Interpolated
3 kW	208V	3 φ	Tap							D5379	Interpolated
6 kW	400 V	3 φ	Tap							D11407	Interpolated
9 kW	208 V	1 φ	Tap							D5545	Interpolated
9 kW	208 V	1 φ	DI							D13652	Interpolated
9 kW	208 V	3 φ	Tap							D5543	Interpolated
9 kW	208 V	3 φ	DI							D13732	Interpolated
9 kW	240 V	1 φ	Tap							D5604	Interpolated
9 kW	240 V	3 φ	Tap							D5605	Interpolated
9 kW	240 V	3 φ	DI							D20060	Interpolated
9 kW	400 V	3 φ	Tap							D11408	Interpolated
9 kW	400 V	3 φ	DI							D11411	Interpolated
9 kW	480 V	3 φ	Tap							D5380	Interpolated
9 kW	480 V	3 φ	DI							D5581	Interpolated
9 kW	600 V	3 φ	Tap							D5381	Interpolated
9 kW	600 V	3 φ	DI							D5582	Interpolated
15 kW	208 V	3 φ	Tap				128 lbs -	230 lbs -		D5544	Interpolated
15 kW	208 V	3 φ	DI				156 lbs	234 lbs		D94560	Interpolated
15 kW	240 V	3 φ	Tap							D5606	Interpolated
15 kW	400 V	3 φ	Tap							D11404	Interpolated
15 kW	400 V	3 φ	DI							D11409	Interpolated
15 kW	480 V	3 φ	Tap							D5382	Interpolated
15 kW	480 V	3 φ	DI							D5583	Interpolated
15 kW	600 V	3 φ	Tap							D5383	Interpolated
15 kW	600 V	3 φ	DI							D5584	Interpolated
18 kW	208 V	3 φ	Tap							D5607	Interpolated
18 kW	208 V	3 φ	DI							D23592	Interpolated
18 kW	240 V	3 φ	Tap							D5608	Interpolated
18 kW	400 V	3 φ	Tap							D11412	Interpolated
18 kW	400 V	3 φ	DI							D11414	Interpolated
18 kW	480 V	3 φ	Tap							D5386	Interpolated
18 kW	480 V	3 φ	DI							D5585	Interpolated
18 kW	600 V	3 φ	Tap							D5387	Interpolated
18 kW	600 V	3 φ	DI							D5586	Interpolated
30 kW	208 V	3 φ	DI							D23594	Interpolated
30 kW	240 V	3 φ	Tap							D5610	Interpolated
30 kW	240 V	3 φ	DI							D23593	Interpolated
30 kW	400 V	3 φ	Tap							D11413	Interpolated
30 kW	400 V	3 φ	DI							D11415	Interpolated
30 kW	480 V	3 φ	Tap							D5388	Interpolated
30 kW	480 V	3 φ	DI							D5587	Interpolated
30 kW	600 V	3 φ	Tap							D5389	Interpolated
30 kW	600 V	3 φ	DI							D5588	Interpolated
30 kW	208 V	3 φ	Tap				156 lbs	234 lbs		D5609	UUT1B.1 & UUT1B.2

Notes:

Addition components used in testing:
S29888C - Seismic bottom mount
S29888A - Seismic top mount

Armstrong - Humidifiers

HC6500/HC6700 (Floor Mounted)											
Power	Voltage	Phase	Water Type	Width	Depth	Height	Weight		Construction Material	Part Number	Testing Status
							Dry	Wet			
30 kW	208 V	3 φ	Tap	26.0 in	32.1 in	56.2 in	280 lbs	501 lbs	Stainless Steel	D5611	UUT3B.1 & UUT3B.2
34 kW	400 V	3 φ	Tap							D11416	Interpolated
34 kW	400 V	3 φ	DI							D11421	Interpolated
40 kW	240 V	3 φ	Tap							D5612	Interpolated
45 kW	208 V	3 φ	Tap							D5613	Interpolated
48 kW	400 V	3 φ	Tap							D11417	Interpolated
48 kW	400 V	3 φ	DI							D11422	Interpolated
48 kW	480 V	3 φ	Tap							D5390	Interpolated
48 kW	480 V	3 φ	DI							D5589	Interpolated
48 kW	600 V	3 φ	Tap							D5391	Interpolated
48 kW	600 V	3 φ	DI							D5590	Interpolated
50 kW	400 V	3 φ	Tap							D11418	Interpolated
50 kW	400 V	3 φ	DI							D11423	Interpolated
50 kW	400 V	3 φ	DI				280 lbs - 286 lbs	501 lbs - 507 lbs		D11423	Interpolated
60 kW	240 V	3 φ	Tap							D7059	Interpolated
60 kW	240 V	3 φ	DI							D23595	Interpolated
67 kW	400 V	3 φ	Tap							D11425	Interpolated
67 kW	400 V	3 φ	DI							D11427	Interpolated
72 kW	400 V	3 φ	Tap							D11420	Interpolated
72 kW	400 V	3 φ	DI							D11424	Interpolated
72 kW	480 V	3 φ	Tap							D5392	Interpolated
72 kW	480 V	3 φ	DI							D5591	Interpolated
72 kW	600 V	3 φ	Tap							D5393	Interpolated
72 kW	600 V	3 φ	DI							D5592	Interpolated
96 kW	400 V	3 φ	Tap							D11426	Interpolated
96 kW	400 V	3 φ	DI							D11428	Interpolated
96 kW	480 V	3 φ	DI							D5593	Interpolated
96 kW	480 V	3 φ	Tap				286 lbs	507 lbs		D5401	UUT3A.1 & UUT3A.2
96 kW	600 V	3 φ	Tap				280 lbs - 286 lbs	501 lbs - 507 lbs		D5402	Extrapolated
96 kW	600 V	3 φ	DI							D5594	Extrapolated

Notes: -Part numbers are for 480 V/3 phase except for below

-30 kW - 208/3, 40 kW - 240/3, 45 kW - 208/3, 60 kW - 240/3

Additional components used in test:

Durakool 30C40 Contactor, D83313 Drain Tempering, A23588 LonWorks Protocontroller, A23589 BACnet Protocontroller

Outdoor enclosure:

34.6"W x 49.5"D x 70.3"H galvanized cold formed steel w/ P1000H3 Unistrut bar connecting top of unit to sides of outdoor enclosure.

Armstrong - Humidifiers

EHU-800 (Wall Mounted)											
Family	Rate	Voltage	Phase	Width	Depth	Height	Weight		Construction Material	Part Number	Testing Status
							Dry	Wet			
EHU801	4.40	120 V	1 φ							D608662	UUT9.1 & UUT9.2
EHU801	4.40	208 V	1 φ							D608668	Interpolated
EHU801	4.40	240 V	1 φ							D608680	Interpolated
EHU801	4.40	277 V	1 φ							D608690	Interpolated
EHU801	6.00	208 V	3 φ							D608698	Interpolated
EHU801	6.00	240 V	3 φ							D608706	Interpolated
EHU801	6.00	480 V	3 φ							D615454	Interpolated
EHU801	6.60	120 V	1 φ							D606770	Interpolated
EHU801	6.60	120 V	1 φ							D606774	Interpolated
EHU801	6.60	208 V	1 φ							D604735	Interpolated
EHU801	6.60	240 V	1 φ							D608682	Interpolated
EHU801	6.60	277 V	1 φ							D608692	Interpolated
EHU801	11.00	120 V	1 φ							D603992	Interpolated
EHU801	11.00	208 V	1 φ							D603387	Interpolated
EHU801	11.00	208 V	1 φ							D612566	Interpolated
EHU801	11.00	208 V	3 φ							D603389	Interpolated
EHU801	11.00	240 V	1 φ							D604737	Interpolated
EHU801	11.00	240 V	1 φ							D610230	Interpolated
EHU801	11.00	240 V	3 φ							D608708	Interpolated
EHU801	11.00	277 V	1 φ							D605338	Interpolated
EHU801	11.00	277 V	1 φ							D608694	Interpolated
EHU801	11.00	480 V	3 φ							D607249	Interpolated
EHU801	11.00	480 V	3 φ							D607253	Interpolated
EHU801	11.00	480 V	3 φ							D610226	Interpolated
EHU801	17.00	208 V	3 φ	25.5	9.96	16.3	46 lbs	60 lbs	Stainless Steel	D606750	Interpolated
EHU801	17.00	208 V	3 φ							D608700	Interpolated
EHU801	17.00	208 V	3 φ							D610994	Interpolated
EHU801	17.00	240 V	3 φ							D606829	Interpolated
EHU801	17.00	480 V	3 φ							D608729	Interpolated
EHU801	17.60	120 V	1 φ							D608666	Interpolated
EHU801	17.60	208 V	1 φ							D608678	Interpolated
EHU801	17.60	240 V	1 φ							D608686	Interpolated
EHU801	17.60	277 V	1 φ							D608696	Interpolated
EHU801	22.00	208 V	3 φ							D608702	Interpolated
EHU801	22.00	240 V	3 φ							D603426	Interpolated
EHU801	22.00	480 V	3 φ							D606274	Interpolated
EHU801	22.00	480 V	3 φ							D609695	Interpolated
EHU801	22.00	480 V	3 φ							D612694	Interpolated
EHU801	33.00	208 V	3 φ							D604874	Interpolated
EHU801	33.00	240 V	3 φ							D608712	Interpolated
EHU801	33.00	380 V	3 φ							D617063	Interpolated
EHU801	33.00	480 V	3 φ							D607247	Interpolated
EHU801	33.00	480 V	3 φ							D607251	Interpolated
EHU801	33.00	480 V	3 φ							D609697	Interpolated
EHU801	33.00	600 V	3 φ							D611003	Interpolated
EHU801	44.00	208 V	3 φ							D608704	Interpolated
EHU801	44.00	240 V	3 φ							D608714	Interpolated
EHU801	44.00	480 V	3 φ							D608327	Interpolated
EHU801	44.00	480 V	3 φ							D610232	Interpolated

Armstrong - Humidifiers

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Notes: -Part numbers are based on the largest 480 V/3 Phase unit available
 Additional Components used in test:
 D83309 - 801 Drain Tempering, D83310 - 803 Drain Tempering, D83311 - 804 Drain Tempering
 D38502 - LonWorks Protonode, D80688 - BACnet Protonode, D50931 - Remote Information
 S29888B - Seismic bottom mount, S29888D - Seismic top mount

Armstrong - Humidifiers

1100-1400 (Rigid floor-mounted w/ top restraint)

Model	Manifold	Duct Width	Min. Depth	Max. Depth	Body Height	Weight	Construction Material	Part Number	Testing Status
1100	M-1	12 in	8 in	14 in	8 5/8 in	20 lbs	Stainless Steel	D666589	UUT5
1100	M-1							D666592	Interpolated
1100	M-1							D666594	Interpolated
1100	M-1							D666596	Interpolated
1100	M-1							D662432	Interpolated
1100	M-1							D666598	Interpolated
1100	M-1							D666600	Interpolated
1100	M-1							D666602	Interpolated
1100	M-1							D666604	Interpolated
1100	M-1							D666606	Interpolated
1100	M-1							D666608	Interpolated
1100	M-1							D666610	Interpolated
1100	M-1							D666612	Interpolated
1100	M-1							D506794	Interpolated
1100	M-1							D666614	Interpolated
1100	M-1							D666616	Interpolated
1100	M-1							D666618	Interpolated
1100	M-1							D666623	Interpolated
1100	M-1							D666625	Interpolated
1100	M-1							D666627	Interpolated
1100	M-1							D666629	Interpolated
1100	M-1							D508418	Interpolated
1100	M-1							D666631	Interpolated
1100	M-1							D559160	Interpolated
1100	M-1							D501890	Interpolated
1100	M-1							D666633	Interpolated
1100	M-1							D506791	Interpolated
1100	M-1							D666636	Interpolated
1100	M-1							D504771	Interpolated
1100	M-1							D666638	Interpolated
1100	M-1							D632001	Interpolated
1100	M-1							D504769	Interpolated
1100	M-1							D507814	Interpolated
1100	M-1							D507355	Interpolated
1100	M-1							D508410	Interpolated
1100	M-1							D618869	Interpolated
1100	M-1							D517396	Interpolated
1100	M-1							D519846	Interpolated
1100	M-1							D508956	Interpolated

-Single dispersion tube

-Various orifice sizes, part numbers configured for smallest orifice size available

Additional Components:

A21505 - 1100 SS Fitting, A4967S - 1100 SS Adapter, C1360-1 through 13 - Fittings

Armstrong - Humidifiers

1100-1400 (Rigid floor-mounted w/ top restraint)

Model	Manifold	Duct Width	Min. Depth	Max. Depth	Body Height	Weight	Construction Material	Part Number	Testing Status
1200	M-1	12 in	8 in	14 in	10 5/16 in	20 lbs	Stainless Steel	D666649	Interpolated
1200	M-1							D666651	Interpolated
1200	M-1							D586121	Interpolated
1200	M-1							D666654	Interpolated
1200	M-1							D666656	Interpolated
1200	M-1							D666658	Interpolated
1200	M-1							D666662	Interpolated
1200	M-1							D666664	Interpolated
1200	M-1							D666668	Interpolated
1200	M-1							D666670	Interpolated
1200	M-1							D666672	Interpolated
1200	M-1							D506796	Interpolated
1200	M-1							D666676	Interpolated
1200	M-1							D666678	Interpolated
1200	M-1							D590272	Interpolated
1200	M-1							D560246	Interpolated
1200	M-1							D538797	Interpolated
1200	M-1							D666680	Interpolated
1200	M-1							D520800	Interpolated
1200	M-1							D512172	Interpolated
1200	M-1							D666682	Interpolated
1200	M-1							D666684	Interpolated
1200	M-1							D506792	Interpolated
1200	M-1							D666690	Interpolated
1200	M-1							D610077	Interpolated
1200	M-1							D545818	Interpolated
1200	M-1							D666692	Interpolated
1200	M-1							D618841	Interpolated
1200	M-1							D666694	Interpolated
1200	M-1							D666696	Interpolated
1200	M-1							D503051	Interpolated
1200	M-1							D527493	Interpolated
1200	M-1							D569576	Interpolated

-Single dispersion tube

-Various orifice sizes, part numbers configured for smallest orifice size available

Additional Components:

A9885 - 1200 SS Fitting, A4967P - 1200 SS Adapter, C924-1 through 13 - Fittings

Armstrong - Humidifiers

1100-1400 (Rigid floor-mounted w/ top restraint)

Model	Manifold	Duct Width	Min. Depth	Max. Depth	Body Height	Weight	Construction Material	Part Number	Testing Status
1300	M-12	144 in	137 in	148 in	16 1/4 in	59 in	Stainless Steel	D666714	Interpolated
1300	M-12							D666718	Interpolated
1300	M-12							D666720	Interpolated
1300	M-12							D666724	Interpolated
1300	M-12							D582101	Interpolated
1300	M-12							D666726	Interpolated
1300	M-12							D666728	Interpolated
1300	M-12							D506797	Interpolated
1300	M-12							D666732	Interpolated
1300	M-12							D666734	Interpolated
1300	M-12							D625118	Interpolated
1300	M-12							D584899	Interpolated
1300	M-12							D610095	Interpolated
1300	M-12							D625100	Interpolated
1300	M-12							D506793	Interpolated
1300	M-12							D666744	Interpolated
1300	M-12							D666751	Interpolated
1300	M-12							D666753	Interpolated
1300	M-12							D666786	Interpolated
1300	M-12							D666790	Interpolated
1300	M-12							D666792	Interpolated

-Single dispersion tube

-Various orifice sizes, part numbers configured for smallest orifice size available

Additional Components:

A11802 - 1300 SS Fitting, A4967R - 1300 SS Adapter, C1501-1 thru 13 - Fittings

1100-1400 (Rigid floor-mounted w/ top restraint)

Model	Manifold	Duct Width	Min. Depth	Max. Depth	Body Height	Weight	Construction Material	Part Number	Testing Status
1400	M-3	144 in	137 in	148 in	24 1/8 in	144 lbs	Stainless Steel	D506798	Interpolated
1400	M-3						Stainless Steel	D584122	Interpolated
1400	M-3						Stainless Steel	D625126	Interpolated
1400	M-3						Stainless Steel	D631288	Interpolated
1400	M-3						Stainless Steel	D666800	UUT6
1400	M-3						Stainless Steel	D666806	Extrapolated
1400	M-3						Stainless Steel	D666808	Extrapolated
1400	M-3						Stainless Steel	D666810	Extrapolated
1400	M-3						Stainless Steel	D666814	Extrapolated
1400	M-3						Stainless Steel	D666816	Extrapolated
1400	M-3						Stainless Steel	D666826	Extrapolated
1400	M-3						Stainless Steel	D666832	Extrapolated
1400	M-3						Stainless Steel	D666838	Extrapolated

-Single dispersion tube

-Various orifice sizes, part numbers configured for smallest orifice size available

Additional Components:

A11803 - 1400 SS Fitting, A5002C - 1400 SS Adapter, C9030-5 thru 13 Fittings

Armstrong - Humidifiers

Humidipack (Out-of-Duct)

Model	Orientation	Height	Depth	Width	Weight		Construction Material	Testing Status
					Dry	Wet		
D3450	Horizontal Header	72.0 in	N/A	72.0 in	122 lbs	N/A	Stainless Steel	UUT8

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 1A.1 (Dry) (Batch 1)

Rigidly Wall Mounted Humidifier – HC 6100 (shown in the middle)

14 ga. 304 Stainless Steel

21.9"W x 22.3"D x 32.1"H, 128 lbs dry

Wall mounted using: (4) - 3/8" – 16 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 31 ft-lbs



DATE: DRY 2/28/2018							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.20	1	3.52	2.64	1.47	0.59
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
>33Hz	>33Hz	>33Hz					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 1A.2 (wet) (Batch 1)

Rigidly Wall Mounted Humidifier – HC 6100 (shown in the middle)

14 ga. 304 Stainless Steel

21.9"W x 22.3"D x 32.1"H, 230 lbs wet

Wall mounted using: (4) - 3/8" – 16 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 31 ft-lbs



WET							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.16	1	3.46	2.59	1.45	0.58
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
>33Hz	>33Hz	>33Hz					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 1B.1 (dry) (Batch 1)

Rigidly Wall Mounted Humidifier – HC 6300 (shown in the right)

14 ga. 304 Stainless Steel

21.9"W x 22.3"D x 32.1"H, 156 lbs dry

Wall mounted using: (4) - 3/8" – 16 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 31 ft-lbs in Armstrong seismic double bracket mounts S29888A & S29888C



DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.20	1	3.52	2.64	1.47	0.59
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
>33Hz	>33Hz	>33Hz					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 1B.2 (wet) (Batch 1)

Rigidly Wall Mounted Humidifier – HC 6300 (shown in the right)

14 ga. 304 Stainless Steel

21.9"W x 22.3"D x 32.1"H, 234 lbs wet

Wall mounted using: (4) - 3/8" – 16 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 31 ft-lbs in Armstrong seismic double bracket mounts S29888A & S29888C



WET							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.16	1	3.46	2.59	1.45	0.58
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
>33Hz	>33Hz	>33Hz					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 3A.1 (dry) (Batch 1 & 5)

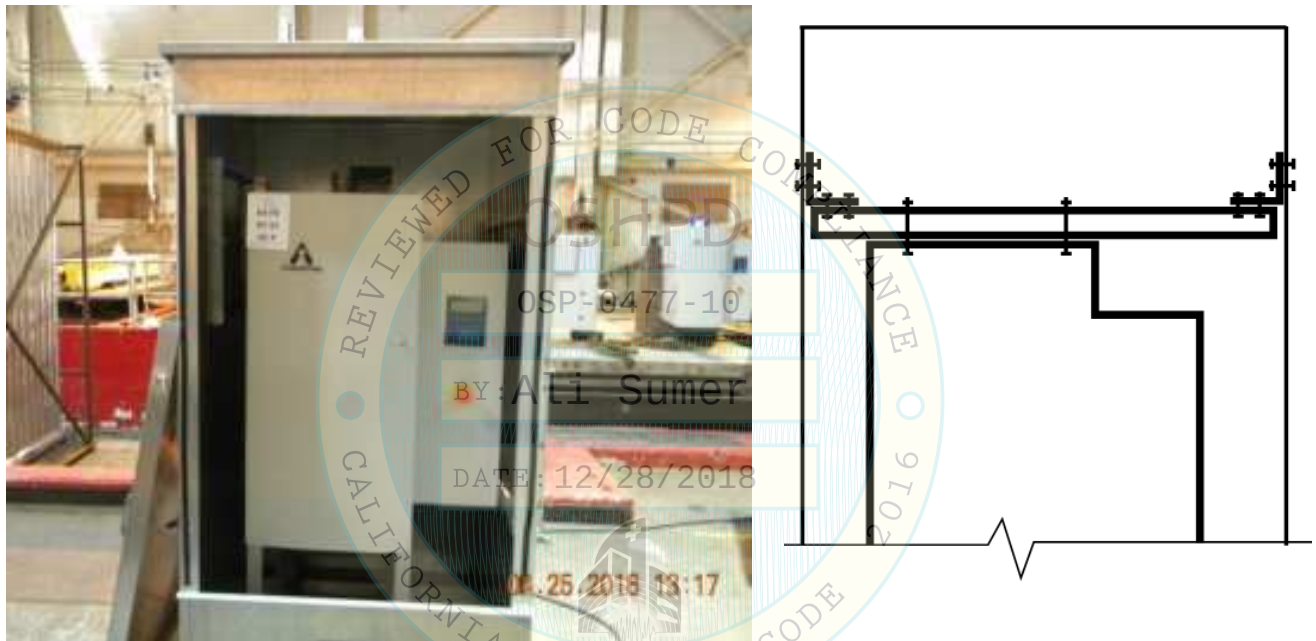
Rigidly Floor Mounted with Outdoor Enclosure – HC 6700

14 ga. 304 Stainless Steel

26"W x 32.1"D x 56.2"H, 156 lbs dry

Floor mounted using: (4) 3/8"-16 bolts, one at each leg through floor of outdoor enclosure;
(20) 1/4"-20 bolts at outdoor enclosure.

A P1000H3 Unistrut bar was installed spanning the width inside the enclosure (side to side, above the front of the UUT) using a Unistrut angle with (2) 1/2"-13 bolts to the side panel of the enclosure and (2) 1/2"-13 bolts to the P1000H3 bar. The P1000H3 bar was then attached to the top of the UUT using (2) 1/2"-13 bolts. This modification prevented water intrusion during run 9.



Following testing, the installation instructions were revised to require additional initial tightening of the outdoor enclosure's latch to prevent the motion that led to the latch bending. The UUT's door hinges were determined to be adequate if they had been tightened after Test Run 1. Revised instructions to tighten the hinge nuts following installation and maintenance is also intended to prevent detachment of the internal fan and door weatherstripping.

DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.20	1	3.52	2.64	1.47	0.59
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
12.79	7.17	19.86					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 3A.2 (wet) (Batch 1 & 5)

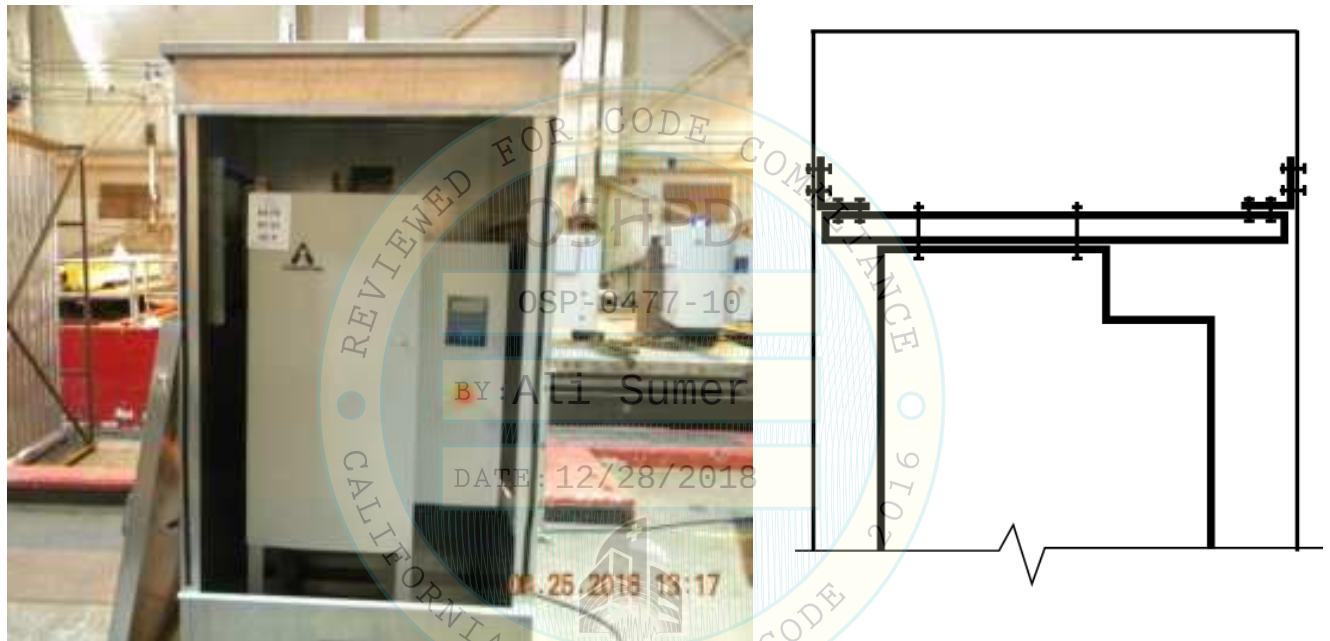
Rigidly Floor Mounted with Outdoor Enclosure – HC 6700

14 ga. 304 Stainless Steel

26"W x 32.1"D x 56.2"H, 614 lbs wet

Floor mounted using: (4) 3/8"-16 bolts, one at each leg through floor of outdoor enclosure;
(20) 1/4"-20 bolts at outdoor enclosure.

A P1000H3 Unistrut bar was installed spanning the width inside the enclosure (side to side, above the front of the UUT) using a Unistrut angle with (2) 1/2"-13 bolts to the side panel of the enclosure and (2) 1/2"-13 bolts to the P1000H3 bar. The P1000H3 bar was then attached to the top of the UUT using (2) 1/2"-13 bolts. This modification prevented water intrusion during run 9.



Following testing, the installation instructions were revised to require additional initial tightening of the outdoor enclosure's latch to prevent the motion that led to the latch bending. The UUT's door hinges were determined to be adequate if they had been tightened after Test Run 1. Revised instructions to tighten the hinge nuts following installation and maintenance is also intended to prevent detachment of the internal fan and door weatherstripping.

WET							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.12	1	3.39	2.54	1.42	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
9.17	5.73	10.71					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 3B.1 (dry)

Rigidly Floor Mounted – HC 6500

14 ga. 304 Stainless Steel

26"W x 32.1"D x 56.2"H, 280 lbs dry

Floor mounted using: (4)- 3/8" – 16 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 25 ft-lbs



DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.20	1	3.52	2.64	1.47	0.59
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
18.36	11.25	> 33					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 3B.2 (wet)

Rigidly Floor Mounted – HC 6500

14 ga. 304 Stainless Steel

26"W x 32.1"D x 56.2"H, 501 lbs wet

Floor mounted using: (4)- 3/8" – 16 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 25 ft-lbs



WET							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.12	1	3.39	2.54	1.42	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
13.1	8.33	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 5 (Batch 4)

Direct Injection 1100

Stainless Steel

See product data for dimensions, 20 lbs

Mounted at top and bottom using: (1) - 1/2" – 13 all thread, washers and nuts (hand tight). One P100T Unistrut strap was attached to the inlet steam pipe. The steam pipe was spot welded to the Unistrut support. One unistrut strap was attached to the condensate drain pipe. The condensate drain pipe was spot welded to the unistrut support.

This unit is rigidly connected at the top and bottom to the structure. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.15	1	3.44	2.58	1.44	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 6 (Batch 3)

Direct Injection – 1400

Stainless Steel

See product data for dimensions, 144 lbs.

Mounted to fixture using (1) ½" -13 all thread, washers and nuts at the top of the body. (1) Unistrut strap was attached to the inlet steam pipe. (1) Unistrut strap was attached to the condensate drain pipe. (1) 3/8"-16 all thread, washers and nuts were used on the manifold. A UBPA Unistrut U-Bolt Clamp was attached to the end of the UUT.

This unit is rigidly connected at the top and bottom to the structure. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.12	1	3.39	2.54	1.42	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 7 (dry) (Batch 3)

Humidipack Centifeed (large)

Stainless Steel

72"W x 144"H, 144 lbs. dry

Mounted using: (18) - 1/4" – 20 grade 5 bolts, washers, lock washers and nuts torqued to 9ft-lbs.

The outboard header plate is connected using (2) 1/2" – 13 all thread, washers and nuts.

This unit is rigidly connected at the top and bottom to steel framing that supports the duct. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.12	1	3.39	2.54	1.42	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 7 (wet) (Batch 3)

Humidipack Centifeed (large)

Stainless Steel

72"W x 144"H, 272 lbs wet

Mounted using: (18) - 1/4" – 20 grade 5 bolts, washers, lock washers and nuts torqued to 9ft-lbs.

The outboard header plate is connected using (2) 1/2" – 16 all thread, washers and nuts.

This unit is rigidly connected at the top and bottom to steel framing that supports the duct. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.12	1	3.39	2.54	1.42	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 8 (dry) (Batch 4)

Humidipack (only) (large)

Stainless Steel

72"W x 72"H, 72 lbs. dry

Mounted using: (18) - 1/4" – 20 grade 5 bolts, washers, lock washers and nuts torqued to 9ft-lbs. The top of the UUT 8 is attached using (2) 1/2" – 13 all thread, washers and nuts hand tight to the wall mount fixture. Rigid compression/tension braces were installed during the test on each side of UUT8.

This unit is rigidly connected at the top and bottom to steel framing that supports the duct. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.15	1	3.44	2.58	1.44	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
10.32	10.68	> 33					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 8 (wet) (Batch 4)

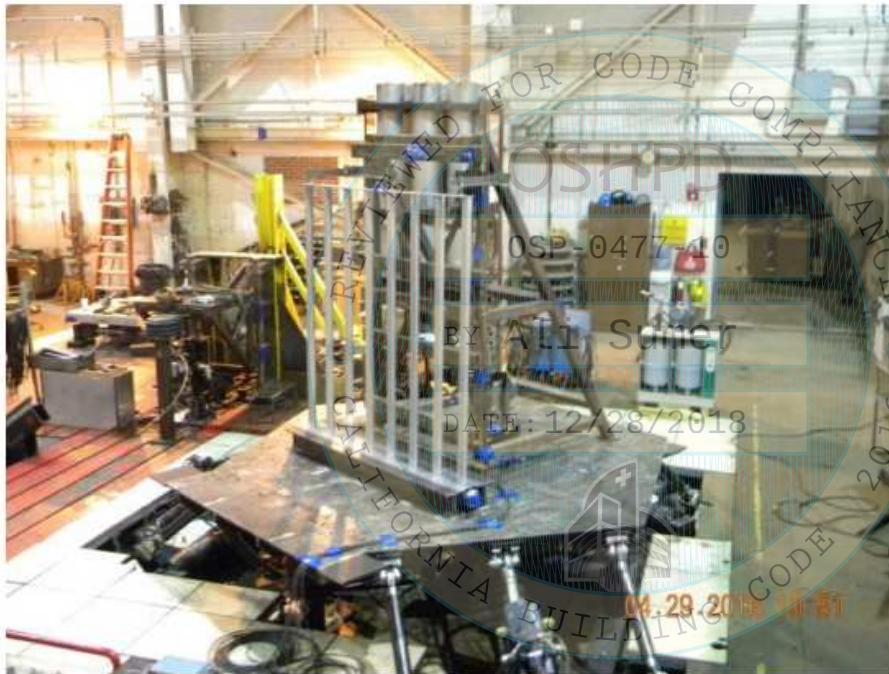
Humidipack (only) (large)

Stainless Steel

72"W x 72"H, 122 lbs. wet

Mounted using: (18) - 1/4" – 20 grade 5 bolts, washers, lock washers and nuts torqued to 9ft-lbs. The top of the UUT 8 is attached using (2) 1/2" – 13 all thread, washers and nuts hand tight to the wall mount fixture. Rigid compression/tension braces were installed during the test on each side of UUT8.

This unit is rigidly connected at the top and bottom to steel framing that supports the duct. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.15	1	3.44	2.58	1.44	0.57
Natural Frequencies (Hz)		Test Results					
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
10.33	10.66	24.21					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 9 (dry) (Batch 2)

EHU 801 Wall Mount – EHU801

Stainless Steel

16.3"W x 10"D x 25.5"H, 46 lbs dry

Wall mounted using: The lower mounting bracket is mounted onto the fixture using (4) 3/8"-16 grade 5 bolts, washers, lock washers, and nuts torqued to 31 ft-lbs. The upper mounting bracket is attached to the fixture using (2) 3/8"-16 grade 5 bolts torqued to 31 ft-lbs. The UUT9 is mounted to the top bracket and attach the lower bracket to the fixture using (2) 3/8"-16 grade 5 hex head bolts, washers, and lock washers torqued to 31 ft-lbs.



DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.16	1	3.46	2.59	1.45	0.58
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 9 (wet) (Batch 2)

EHU 801 Wall Mount – EHU801

Stainless Steel

16.3"W x 10"D x 25.5"H, 60 lbs wet

Wall mounted using: The lower mounting bracket is mounted onto the fixture using (4) 3/8"-16 grade 5 bolts, washers, lock washers, and nuts torqued to 31 ft-lbs. The upper mounting bracket is attached to the fixture using (2) 3/8"-16 grade 5 bolts torqued to 31 ft-lbs. The UUT9 is mounted to the top bracket and attach the lower bracket to the fixture using (2) 3/8"-16 grade 5 hex head bolts, washers, and lock washers torqued to 31 ft-lbs.



WET							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.13	1	3.41	2.56	1.43	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 10 (dry) (Batch 2)

EHU 804 Wall Mount – EHU804

Stainless Steel

33.6"W x 14.1"D x 31.8"H, 126 lbs dry

Wall mounted using: The lower mounting bracket was attached onto the UUT using (2) 3/8" -16 bolts, washers, lock washers and nuts torqued to 31 ft-lbs. The upper mounting bracket is mounted to the fixture using (5) 3/8" -16 bolts torqued to 31 ft-lbs. UUT10 is mounted to the upper bracket and attach the lower bracket to the fixture using (2) 3/8"-1 grade 5 hex head bolts, washers, and lock washers torqued to 31 ft-lbs. (2) 3/8"-16 grade 5 hex head bolts through the enclosure holes were added.



DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.13	1	3.41	2.56	1.43	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 10 (wet) (Batch 2)

EHU 804 Wall Mount – EHU804

Stainless Steel

33.6"W x 14.1"D x 31.8"H, 240 lbs wet

Wall mounted using: The lower mounting bracket was attached onto the UUT using (2) 3/8" -16 bolts, washers, lock washers and nuts torqued to 31 ft-lbs. The upper mounting bracket is mounted to the fixture using (5) 3/8" -16 bolts torqued to 31 ft-lbs. UUT10 is mounted to the upper bracket and attach the lower bracket to the fixture using (2) 3/8"-1 grade 5 hex head bolts, washers, and lock washers torqued to 31 ft-lbs. (2) 3/8"-16 grade 5 hex head bolts through the enclosure holes were added.



WET							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.13	1	3.41	2.56	1.43	0.57
Natural Frequencies (Hz)			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 11 (Batch 2)

Humidipack Centifeed (small)

Stainless Steel

12"W x 12"H, 12 lbs dry or 17 lbs

Mounted using: (4) ½" -20 grade 5 hex head bolts, washers and lock washers torqued to 9 ft-lbs. Also use (1) ½" -13 all thread and nuts (hand tightened).

This unit is rigidly connected at the top and bottom to the structure. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.16	1	3.46	2.59	1.45	0.58
Natural Frequencies			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					

OSP APPLICATION
Armstrong International – Armstrong Humidifiers
III. UUT Summary Sheets

Test Report 16-00150 – UUT 12 (Batch 2)

Humidipack (only) (small)

Stainless Steel

12"W x 12"H, 12 lbs

Mounted using: (4) ¼" -20 grade 5 hex head bolts, washers, lock washers, and nuts torqued to 9ft-lbs and one (1) ½"-13 grade holes into the seismic table. The fixture was secured to the plate using four (4) ½" -13 grade 5 hex head bolts, washers, and lock washers torqued to 75 ft-lbs.

This unit is rigidly connected at the top and bottom to the structure. The UUT is not connected directly to the duct. The UUT can move independently of the duct, which has oversized holes where the UUT passes through the duct in order to work inside of the duct. See cut sheets for further details.



DRY							
Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H} (g)	A _{RIG-H} (g)	A _{FLX-V} (g)	A _{RIG-H} (g)
CBC 2016	ICC-ES AC 156	2.16	1	3.46	2.59	1.45	0.58
Natural Frequencies			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. UUT full of contents during testing.				
n/a	n/a	n/a					