

Addendum No. 2

Project: University of Arkansas Animal Facility (CLAF)
700 Research Center Blvd.
Fayetteville, AR 72701

Architect: DEMX architecture
104 N East Ave.
Fayetteville, AR 72701

All bidders shall take note of the following revisions and/or additions to the plans and/or specifications for the above referenced project and adjust their bids accordingly. These revisions and/or corrections are hereby made part of said documents as if included therein. **Note: Bid opening date has been moved to Tuesday February 11, at 2:30pm, same location (University Administration Building, ADMN Room 321, 1125 West Maple Street, Fayetteville, Arkansas 72701)**

1. SPECIFICATIONS:
 - a. Updated: 00 42 00 – Bid Form
 - b. Added: 11 53 17 – Laboratory Equipment Washers
2. DRAWINGS:
 - a. Revised Equipment Schedule – See attached below.
3. RFI LOG:
 - a. See responses below.
4. SUBSTITUTION REQUESTS
 - a. See responses below.

RFI No.	Date Received	Question	Answer
23	1/27/2020	3.3 in Section 087100 says other manufacturers can be used. However on other U of A projects it has not been allowed. Please confirm if another product can be used in lieu of Corbin Russwin.	Corbin Russwin is the university standard and will be the only manufacturer allowed for the door hardware on this project
24	1/27/2020	Can we get a Reflected Ceiling Plan for the existing ceiling? Or more information on what is currently there. Including ceiling types, fire suppression, electrical, and mechanical?	There are no existing drawings available
25	1/27/2020	Will a Spec be provided for the Chain Link Fence?	Chain-link Fences and Gates is under section 02 82 10 in the spec book
26	1/27/2020	Sheet E2.1 detail 1 Riser diagram: Existing panel DP3 is shown to feed new panel NPE1 via new ATS. There is not enough buss space to add a new 200Amp 3pole circuit breaker in panel DP3. Please advise.	Intent was to utilize the existing 200A/3P circuit breaker marked "MECH PANEL MEE" in panel "DP3" for new ATS/NPE1. Utilize existing conduit/conductors into our space and extend as required. Verify existing conductors are sized for 200A.
27	1/27/2020	Sheet E2.1 Detail 1 Riser diagram: Existing panel PD is shown to feed new panel HP1. Panel PD will not accept a 400Amp frame breaker (Per Square D field office the largest breaker would be 250Amp). Please advise	The load on new panel HP1 is below 250A. For new panel HP1, in lieu of new 400A circuit breaker and feeder, provide new 250A circuit breaker and feeder.
28	1/27/2020	Roofing Scope – Clarification request concerning quantity (start/stop) and warranty. This would be an excellent time for the owner to solve the problem with a new roof and 20-yr warranty.	There is a future reroof project planned, but the university would prefer to restore existing roof for this project. Clarification: Roof manufacturer to provide 15-year warranty for restoration system.
29	1/27/2020	Controls IDIQ installer and equipment allowed – please clarify.	Yes, winning controls IDIQ installer and equipment allowed. 23 09 00 – Building Automation System to be provide in future addendum
30	1/27/2020	VF Drives: with several manufacturers listed, not all are actually equal. Mixing manufacturers may cause maintenance and programming issues. Please clarify	Variable frequency drives to be provided with the equipment by the equipment manufacturer. Approved VFD vendors to be Danfoss, ABB, and square D and should be equal in all functionality as defined by section 23 (currently being reviewed by University - to be provided in future addendum) and/or the campus IDIQ standard systems.

31	1/27/2020	Equipment Log Clarification: Sheet a1.3, Equipment List item #16 is labeled as "Double Compartment Utility Sink" (see MEP). Sheet MEP item #16 is labeled as a "Bottle Filler".	Correction: TRI TAG 16 shown on the equipment schedule on sheet MEP not a bottle filler. It's S-3 in the plumbing equipment schedule and located on P2.0. There is no bottle filler in the project.
32	1/27/2020	Demo SOG: Extent of work? Structural sheet calls out removing existing slab and replace with new. Demolition notes say to demolish slab as required. Please verify extent of slab demolition & replace ("as needed" or "all")	Isolated slab to be demolished. Remaining slab demolition as required by contractor to install under slab plumbing systems. Full slab demo is not required.
33	1/27/2020	EZ Cage and Rack Washer clarification: Sheet a1.2 deductive alternate, item 3 says Owner provided / Contractor installed. Sheet a1.3, Equipment List notes, item 2 says "provided by contractor and installed by contractor". Please clarify if Washer is OFOI, OFCI or CFCI, also provide contact information for EZ Washer.	The Base bid will be for the contractor to furnish and install the cage wash, and Deductive alternate #2 will be for the installation of the cage washer should the University choose to purchase that piece of equipment.
34	1/28/2020	Reference Sheet A1.3; Equipment List. Reference Items 1 -20. Some of the manufacturers are requesting additional information on exact model numbers and/or options and accessories required. Reference Item No. 11; Submit for Approval. Need Model number and manufacturer information. Also, please provide a matrix with these items as to which ones will be Owner Furnished/Owner Installed and Contractor Furnished/Contractor Installed.	See revised equipment schedule for all model numbers and additional components. See spec section 11 53 17 for more information on the cage washer. It is still the intent for all items on the equipment schedule to be furnished and installed by the contractor for the base bid. The one exception is identified in RFI #33 above as an alternate.
35	1/29/2020	Is the contractor going to be required to pull data/low voltage wires? Or will the contractor only be required to install conduit in wall with a pull string?	The contractor is responsible for the low voltage wiring between the wall termination and the patch panel termination in the ENRC 4401m data closet, and should provide test results to verify the cabling is terminated correctly.
36	1/29/2020	Will the pad beneath the proposed generator be sufficient, or will the pad have to be installed/modified?	A new concrete pad will need to be provided for the generator. Drawing to be updated in future addendum.

37	1/29/2020	All specs related to the equipment listed on sheet A1.3 and any other equipment specs that are not included in the bid docs	See updated equipment schedule for specific model numbers and addition components. See spec section 11 53 17 for more information on the cage washer. That's all the information on the equipment that is known at this time.
38	1/29/2020	P2.1 shows oxygen piping going from the cylinders/manifold to the users as 2" conduit. Please specify what the conduits is for. Or will this be the Swagelok piping as scheduled? Also what sizes and what type of connection /wall plate for the user? Will these connections be supplied by the contractor?	Med gas piping should be updated to reflect final med gas requirements. 2" main from oxygen manifold to be routed across to aseptic surgery. Route branch to wall ports in Bio Procedure, Aseptic Surgery, Chem Cont. 1, and Chem Cont. 2. Branch size requirements to be coordinated with user group and med gas provider.
39	1/29/2020	P1.0 has a Medical Compressed Air in the piping material schedule. We don't find any medical compressed air piping or compressor on the drawings. Will there be any med compressed air? Is the only compressed air going to the cage washer on MEP?	Compressed air is only being routed to the cage washer. It is to be treated as medical compressed air.
40	1/29/2020	Page a1.2, <i>keynote: New Floor Plan, #14 Analog Wall Phone</i> . Who is to supply this and if so does the contractor supply hookup of said phone, i.e wiring destinations.	To be addressed in future addendum
41	1/29/2020	Page a1.4, Keynotes: Reflected Ceiling Plan, #2- Security Camera Facing Exit Door. Who is to provide this? Who is to install this item?	This should be in Triple S' contract with the GC, and may require some coordination with the electrician. The security camera will tie into the in-house system at ENRC
42	1/29/2020	Please provide us with the names/email addresses of the IDIQ contractors.	Contacts for Harrison Energy Partners and Powers of Arkansas are attached below

43	1/29/2020	Please clarify the intent of deductive alternate 2	<p>The intent of Deductive Alternate #2 is that the University can remove the scope from the GC's contract to help get the cost within budget. This would only be done if the University could get additional funds to execute the HVAC controls work through the IDIQ.</p> <p>The controls IDIQ contractors should provide bids as usual to the GC's. They should also provide a proposal directly to the UofA so we have it if they need to use it. The IDIQ providers do not need to provide bonds, insurance, and other contract documents to the U of A at this time. Just a proposal.</p>
44	1/30/2020	<p>It was mentioned in the Prebid that the bid was to be submitted to room No 132. Is this the same building the project is being done in? (CLAF) Confirm the address and any other names required for Bid Envelope submittal confirm where the actual bids need to be submitted and to whom and will they be read aloud after the 2 PM Deadline?</p>	<p>Bids may be mailed or delivered in a sealed envelope to the University Administration Building, ADMN Room 321, 1125 West Maple Street, Fayetteville, Arkansas 72701, Attention: James Ezell by the revised bid date indicated at the beginning of this addendum. This is not at the ENRC project site. Bids will be publicly opened and read aloud after the bid opening deadline. Interested parties are invited to attend.</p>

Substitution Request Log

Sub. No.	Date Received	Question	Answer
3	1/27/2020	Silicone Coating & Alternate Roof Coating System	The 502 Elasto Kote and 670 Silicone systems are approved. See approved request forms
4	1/29/2020	Lab Design Inset Metal casework submitted as substitution	Lab Design inset metal casework is an acceptable substitution, with one comment. The manufacturer must be capable of providing a backsplash that matches the countertop finish and that extends from the countertop to the bottom of the upper cabinets as indicated on the drawings with holes that are coordinated with outlets, switches, and wall plates. Full range of manufacturers colors for the base cabinets to be submitted for architect's approval during submittal process. See approved s

IDIQ Contractor Contact Info

Harrison Energy Partners

<p>Mike McClellan Harrison Energy Partners President AdminTeam (501) 661-0621 Work (501) 539-0430 Mobile MMcClellan@harrisonenergy.com 1501 Westpark Drive Suite 9 Little Rock, AR 72204</p>	<p>Drew Harrison Harrison Energy Partners VP Operations AdminTeam (501) 661-1058 Work (501) 539-1920 Mobile dh@harrisonenergy.com 1501 Westpark Drive, Suite 9 Little Rock, AR 72204</p>	<p>Greg Blair Harrison Energy Partners Sales Manager SalesTeam (501) 661-0621 Work (501) 539-0432 Mobile GBlair@harrisonenergy.com 1501 Westpark Dr., Suite 9 Little Rock, AR 72204</p>
<p>William A. Harrison Harrison Energy Partners Chief Executive Officer AdminTeam (501) 661-0621 Work (501) 529-0445 Mobile bharrison@harrisonenergy.com 1501 Westpark Drive, Suite 9 Little Rock, AR 72204</p>	<p>Lee R. Wilson Harrison Energy Partners Controls Sales Account Manager SalesTeam (479) 879-7517 Work (479) 879-7517 Mobile LWilson@harrisonenergy.com 2499 South Maestri Rd. Springdale, AR 72762</p>	<p>Paul Brewer Harrison Energy Partners Account Team Leader (479) 361-2030 Work PBrewer@harrisonenergy.com 2499 South Maestri Rd. Springdale, AR 72762</p>

Powers of Arkansas

<p>Chase Ransom 479-652-0461 Work cransom@powersar.com sip:cransom@powersar.com IM</p>	<p>Simon Ratcliff Powers of Arkansas Controls Specialist (918) 721-1077 Work sratcliff@powersar.com sratcliff@powersar.com sratcliff@powersar.com IM</p>	<p>Blake McCullough 479.295.4195 Work BMcCullough@powersar.com sip:bmccullough@powersar.com IM</p>
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EQUIPMENT LIST				
	DESCRIPTION	MANUFACTURER	MODEL#	QUANTITY
1	FIXED SHELF RACK SRF5-602472	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	SRF5-602472	10
2	LARGE MOUSE CAGE COMPLETE SET IN POLYCARBONATE	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	207063	40 PER ROOM
	- STANDARD POLYCARBONATE LARGE MOUSE CAGE	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	RC86D-PC	' '
	- LARGE MOUSE FLAT RIM WIRE BAR LID	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	WL86F	' '
	- STANDARD POLYCARBONATE LARGE MOUSE/RAT FILTER TOP	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	FT8XL-PC	' '
	- POLYSULFONE WATER BOTTLES	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	WB16RHE	' '
	- TWIST CAP FOR NECK SIZE 8.5	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	TCCN8.5-ST2.5SB	' '
3	MOUSE CAGE COMPLETE SET IN POLYCARBONATE	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	207062	160 PER ROOM
	- POLYCARBONATE MOUSE CAGE	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	RC71M-PC	' '
	- LARGE MOUSE FLAT RIM WIRE BAR LID	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	WL71F	' '
	- STANDARD POLYCARBONATE MOUSE FILTER TOP	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	FT71H-PC	' '
	- POLYSULFONE WATER BOTTLES	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	WB16RHE	' '
	- TWIST CAP FOR NECK SIZE 8.5	ALTERNATIVE DESIGN MANU. & SUPPLY, INC.	TCCN8.5-ST2.5SB	' '
4	STAINLESS STEEL TABLE 24" X 36"	EAGLE MHC, VWR CAT#: 14900-804	ET2436B	3
5	PURICARE OPEN ACCESS TRANSFER STATION	LABCONCO, VWR CAT#: 82003-760	3820000	1
6	XSTREAM HOOD 6FT/115V	LABCONCO, VWR CAT#: 89260-062	110610000	2
	- IS MULTI-SPD BLOWER FRP 12 INCH 115V	LABCONCO, VWR CAT#: 76311-768	7181812	1
	- VENT KIT F/ACID STRGE CABINET	LABCONCO, VWR CAT#: 15202-504	3591100	2 (PER HOOD)
	- SPILL STOPPER 6FTXSTREAM WORK SURFACE	LABCONCO, VWR CAT#: 89260-078	9503610	1
	- GUARDIAN DIGITAL AIRFLOW MONITOR 115V	LABCONCO, VWR CAT#: 89260-084	9413400	1
	- VWR BASE UNIT ACD 2DR 36X22X36	VWR	CFG-2806-A	2 (PER HOOD)
	- VWR BASE UNIT REAR SCRIBE 36X8	VWR	CFL-0836-R	2 (PER HOOD)
7	WALL-MOUNTED GAS CYLINDER BRACKET	VESTIL	CB-W-2S	1
8	STAINLESS STEEL CART 12" X 24"	VWR	97005-266	2
9	DIPLOMAT 7.0 CU.FT. CHEST FREEZER DCFM070C1WM	DANBY	DCFM070C1WM	1
10	GARB-EL AL-75-P	GARB-EL PRODUCTS COMPANY	AL-75-P	1
11	48" X 18" WIRE SHELVEING ON CASTERS	ULINE OR SIMILAR	H-4256	1
12	18L LAB AUTOCLAVE STERILIZER VACUUM STEAM MINI TR250N	ZGOOD	ZG-8L250	1
13	STAINLESS STEEL TABLE 60" X 30"	EAGLE MHC, VWR CAT#: 14900-820	ET2436B	1
14	6' PURIFIER LOGIC+ CLASS II A2 BIO SAFETY CABINET W/10" SASH	LABCONCO	302610000	1
	- w/ 6' TELESCOPING BASE STAND W/ LEVELING FEET AND SHELF	LABCONCO	3401006	1
15	NARCOTIC CABINET (2-DOOR, 1-SHELF, 2-LOCKS, 12"Lx8"Dx15"H)	LAKESIDE MANUFACTURING	LNC-11D	1
16	DOUBLE COMPARTMENT UTILITY SINK [S-3 ON P1.1 MEP]	SEE MEP	SEE MEP	1
17	STAINLESS STEEL CART 18" X 36"	VWR	97005-274	2
18	ATLANTIS EZ CAGE & RACK WASHER W/ PIT	IWT TECNIPLAST COMPANY	N/A (SEE SPEC)	1
19	TABLETOP ANESTHESIA SYSTEM W/ MINIVAC ACTIVE SCAVENGING	HARVARD APPARATUS	75-0232	1
20	STAINLESS STEEL TABLE 48" X 30"	EAGLE MHC, VWR CAT#: 14900-818	ET3048B	1

NOTES:

- CONTRACTOR TO VERIFY QUANTITIES & LOCATIONS
- ALL EQUIPMENT LISTED ABOVE TO BE PROVIDED BY CONTRACTOR & INSTALLED BY CONTRACTOR.
- COMPLETE MOUSE CAGE ASSEMBLY CONSISTS OF CAGE, WIRE BAR, FILTER TOP, BOTTLE, CAP - VERIFY FINAL MOUSE CAGE ASSEMBLIES & QUANTITIES PRIOR TO ORDERING

End of Addendum No. 2

Date of Addendum No. 2: January 30, 2020.

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

BID FORM
Section 00 42 00

Bid Time: 2:30 p.m. Bid Date: Feb 11, 2020
Location: University Administration Building, ADMN Room 321, 1125 West Maple Street, Fayetteville, Arkansas 72701

BID FROM:

BID TO: University of Arkansas Board of Trustees acting for and on behalf of The University of Arkansas at Fayetteville

PROJECT: University of Arkansas Animal Facility (CLAF)

Gentlemen:

1. Having carefully examined the Contract Documents for this project, as well as the premises and all conditions affecting the proposed construction, the undersigned proposes to provide all labor, materials, services, taxes and equipment necessary for, or incidental to, the construction of the project in accordance with the Contract Documents within the time set forth, for the lump sum base bid of:

\$ _____
Dollar Amount Is To Be Shown Both Numerically and Written Out

2. ALTERNATES: Alternates pricing to the bid total is listed below. See Specification Section 01 23 00 - ALTERNATES.

- #1 - See Section 01 23 00 3.1A. _____ (\$ _____)
1. Base Bid: All Millwork/ Cabinets including Millwork Elevation 4/a3.0 All millwork 4818B BiO Procedure and Millwork Elevation 3/a3. Base Cabinet, Countertop, and Upper Cabinet
 2. Deductive Alternate: Millwork Elevation 6/a3.0 **substitute** drop-in sink with wall mounted sink and Millwork Elevation 7/a3.0 **substitute** drop-in sink with wall mounted sink, no base cabinet, countertop, or upper cabinet
- #2 - See Section 01 23 00 3.1B. _____ (\$ _____)
1. Base Bid: Include all Controls and installation in Base Bid
 2. Deductive Alternate: **Delete** Controls and Controls Installation
- #3 - See Section 01 23 00 3.1C. _____ (\$ _____)
1. Base Bid: Include all equipment as shown in Construction Documents
 2. Deductive Alternate: Reference page a1.13-**Delete** Contractor Provide and Install Item #18 in EQUIPMENT LIST: Atlantis EZ Cage & Rack Washer w/ Pit. All plumbing, electric, compressed air and other rough-in to remain.

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
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[4. Ark. Code Ann. § 22-9-212 requires the contractor to indicate on this bid form the cost of Trenching Safety Systems. ***FAILURE TO SHOW THIS COST WILL INVALIDATE THE BID.*** (NOTE THIS COST SHALL BE INCLUDED IN THE ABOVE BASE BID).

)

Dollar Amount Is To Be Shown Numerically.

5. **Completion Time:** Bidder agrees that the work will be substantially complete and ready for final payment in accordance with the Contract Documents within **180** consecutive calendar days of the date established in a written notice to proceed.
6. The undersigned, in compliance with the Contract Documents for the construction of the above named project, does hereby declare:
 - a. That the undersigned understands that the Owner reserves the right to reject any and all bids and to waive any formality.
 - b. That if awarded the Contract, the undersigned will enter into an Agreement, on a form identical to the form included in the Contract Documents and execute required performance and payment bonds within days after receipt of the Intent to Award, will commence work within 10 days after the date of the Notice to Proceed, and will complete the Contract fully within the time for completion as indicated. Should the undersigned succeed in fully completing the work within the above stated time, he/she shall be paid by the Owner a fixed, agreed upon, bonus.
 - c. The undersigned further agrees that the bid security payable to Owner and accompanying this proposal shall become the property of the Owner as liquidated damages if the undersigned fails to execute the Contract or to deliver the required bonds to the Owner within 5 days from receipt of the Intent to Award as these acts constitute a breach of the Contractor's duties.
 - d. That this bid may not be withdrawn for a period of **10** days after the bid opening.
 - e. The undersigned understands that the Owner's intent is to construct all facilities proposed within the limits established by the funds appropriated for the project.
 - f. The names of subcontractors and the nature of the work to be performed by each one have been included on the Bid Form.
 - g. Bids submitted by a "Joint Venture/Joint Adventure" shall be signed by representatives of each component part of the Joint Venture. The licenses of each component part of the Joint Venture shall also be listed in the bid submittal. Therefore, joint venture bidders shall indicate at least two (2) signatures and two (2) license numbers on the Bid Form. Exception: Joint Ventures who have been properly licensed with the Arkansas Contractors Licensing Board as a "Joint Venture" need only to indicate the joint venture license number on the Bid Form. Joint Venture bidders shall indicate at least two (2) signatures on the Bid Form even if they are licensed as a joint venture.
7. The following documents are attached to and made a condition of this Bid.
 - a. Bid security.
 - b. Listing of Mechanical, Plumbing, Electrical and Roofing Subcontractors, if required.
8. The undersigned acknowledges receipt of and inclusion as a part of the Contract Documents the following addenda:

No. _____ Dated _____

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

No. _____ Dated _____

No. _____ Dated _____

No. _____ Dated _____

9. LISTING OF MECHANICAL, PLUMBING, ELECTRICAL AND ROOFING SUBCONTRACTORS

ALL MECHANICAL, PLUMBING, ELECTRICAL AND ROOFING SUBCONTRACTORS SHALL BE LISTED REGARDLESS OF QUALIFICATIONS, LICENSURES OR WORK AMOUNT. BIDDERS SHOULD CONSULT THE PROJECT MANUAL ON HOW TO FILL OUT THIS FORM. FAILURE TO NAME THE SUBCONTRACTOR IN THE SPACE PROVIDED SHALL CAUSE THE BID TO BE DECLARED NON-RESPONSIVE AND THE BID WILL NOT RECEIVE CONSIDERATION.

Indicate the Name(s), of each entity performing the listed work:

MECHANICAL: (Indicative of HVAC)

Name: _____ License No. _____
Is the amount of work \$20,000.00 or over: Yes ___ No ___

PLUMBING:

Name: _____ License No. _____
Is the amount of work \$20,000.00 or over: Yes ___ No ___

ELECTRICAL: (Indicative of wiring and illuminating fixtures)

Name: _____ License No. _____
Is the amount of work \$20,000.00 or over: Yes ___ No ___

ROOFING AND SHEETMETAL (Indicative of roofing applications)

Name: _____ License No. _____
Is the amount of work \$20,000.00 or over: Yes ___ No ___

Respectfully Submitted:

Name of Bidder (Typed or Printed)

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

Address

BY: (Signature and Title)

Contractor's Joint Venture License Number(s) or Contractor's License No.

Telephone Number

Fax Number

Federal ID Number or Social Security Number

Date of Bid

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

**SECTION 11 53 17 – LABORATORY EQUIPMENT WASHERS
CAGE AND RACK WASHER**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Laboratory animal cage and rack washing equipment.
2. Installation requirements.

1.02 DEFINITIONS

A. Definitions:

1. Cycle Time: Time to complete one (1) washing cycle measured from the initiation of cycle until the unload door can be opened safely.
2. Cages: Molded plastic rodent cages
3. Racks: Metal, mobile rack for housing rodent cages.
4. Logistic Equipment: Miscellaneous carts, racks, trolleys, pallets, or cage accessories.

B. Abbreviations:

1. CFCI: Contractor Furnished, Contractor Installed.
2. OFCI: Owner Furnished, Contractor Installed.
3. OFOI: Owner Furnished, Owner Installed
4. CFM: Cubic Feet per Minute.
5. FAT: Factory Acceptance Test.
6. I/O: Input/Output.
7. IVC: Individually Ventilated Cage.
8. LCD: Liquid Crystal Display.
9. LED: Light-emitting Diode.
10. PLC: Programmable Logic Controller.
11. SAT: Site Acceptance Test.

1.03 SUBMITTALS

A. Prior to Fabrication:

1. Statement of manufacturer and installer qualifications
2. Project Schedule
3. Indicate time required for shop drawings production.
4. Indicate time required for fabrication.
5. Indicate time required for installation.
6. Indicate time required for Site Acceptance Test.
7. Sample of warranty
8. Product Data
9. System description and technical data information.
10. System operational features.
11. Shop Drawings
 - a. Show entire assembly, materials, components and dimensions.
 - b. Wiring and pneumatic diagrams delivered with the machine.
 - c. P&ID diagrams delivered with the machine.

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
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- 49 d. Show electrical, plumbing and mechanical ductwork service requirements including
50 connection locations and rough-in dimension.
51
52

53
54 1.04 DELIVERY, STORAGE AND HANDLING
55

- 56 A. Packing and Shipping:
57 1. Package and ship products in manner to avoid damage.
58 2. Coordinate equipment delivery schedule with General Contractor to minimize storage of
59 equipment before installation.
60 3. Coordinate delivery with contractor.
61

62 1.05 PROJECT CONDITIONS
63

- 64 A. Existing Conditions: Review surfaces and conditions under which equipment is to be installed.
65 B. Field Measurements:
66 1. Project Manager shall verify available space and required clearance prior to fabrication.
67 2. Report to Customer in writing items that will affect the installation, equipment operation and
68 usage of the space.
69

70 1.06 SEQUENCING AND SCHEDULING
71

- 72 A. Coordinate installation to ensure utility connections are achieved in orderly and expeditious
73 manner.
74 B. Perform commissioning after completion of the installation and completion of utility
75 connections.

76 1.07 WARRANTY
77

- 78 A. Manufacturer shall warrant that equipment furnished under this section be free of defective
79 materials, design, and workmanship.
80 B. Warranty Period: Installed system, including parts and labor: Two years, commencing on the date
81 of the completion of the commissioning of the unit.
82

83 1.08 MAINTENANCE
84

85 Maintenance Services:

- 86 A. Performed by one of the following:
87 1. Manufacturer's field service technician.
88 2. Manufacturer's trained and authorized field service representative.
89 B. Request for maintenance assistance via telephone call shall be responded to within four (4)
90 hours of initial call. This service shall be available during normal office hours (8:30 AM – 5:00 PM
91 EST), Monday through Friday (excluding holidays).
92 C. On site response, when required, shall be within 48 hours of initial request and approval.
93

94 Extra Materials:

- 95 A. Spare parts which are manufacturer's proprietary products shall be available for on-site
96 replacement within 72 hours.
97

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
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98

99 PART 2 - PRODUCTS

100

101 2.01 MANUFACTURER

102

103 A. Manufacturer:

104 Basis of design: Atlantis Easy Series Techniplast/IWT Washer

105

106 B. Alternate

107

108 2.02 SCOPE OF WORK

109 A. Rack washer for cage washing area.

110

111 2.03 RACK WASHER - GENERAL

112

113 A. Size and Configuration:

114 1. Exterior Dimensions:

115 a. Width: 95 ¼ "

116 b. Length: 100 "

117 c. Height: 106 1/3 "

118 d. Recommended Minimum ceiling Height : 118"

119 2. Internal Chamber Dimensions: 48.8 "(W) x 90.5 "(L) x 87.9 "(H)

120 3. Loading Capacity: One of the following per load.

121 a. One standard presentation rack

122 b. Two compact presentation rack

123 c. One double-sided IVC rack / Rabbit Racks / Primate Racks.

124 4. Treatment Phases and Cycle Time:

125 a. Each wash cycle that includes detergent wash, drip, rinse, and vapor exhaust treatment
126 shall not exceed:

127 I. Rodent cages- 10 minutes

128 II. Rabbit racks – 8-15 minute

129 b. Wash cycle must be shown to be microbiologically validated while only using a single rinse
130 phase.

131

132 5. Installation Configuration:

133 a. Pit-mounted

134 b. Door(s): Double door configuration as indicated on drawings.

135 c. Door Mounting and Operation: Hinged, manual operation. Doors swing adjustable
136 per customer request.

137 d. Pit must be 6" maximum in depth

138

139 B. Operational Features

140 1. Heating System: Steam

141 2. Spray System:

142 a. Separate wash and rinse nozzles on oscillating manifolds

143 b. 100% separated wash and rinse circuits to prevent any risk of cross contamination

144 3. Machine Operation: Wash cycle shall be selectable and started from control system's
145 operator interface panel. Equipped with the following features:

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

- 146 a. Recirculating water system equipped with in-line self-cleaning filter.
147 b. Water and energy saving features.
148 c. Vented vapor removal system.
149 d. Water Consumption: Not to exceed 20 gal/cycle
150 4. Treatment Phases: Each wash cycle shall be able to be programmed for but not
151 limited to the following: Detergent Wash, Drip, Rinse, and Vapor exhaust.
152 a. Detergent Wash:
153 I. Wash with hot water and detergent.
154 II. Water supply: Wash tank.
155 III. Temperature: Not less than 140 degree F.
156 a. Dripping: Pauses before next phase to allow detergent water to drain back to wash tank;
157 followed by back flushing the in-line self-cleaning filter.
158 b. Rinse: Rinse with non-recirculated clean, hot water.
159 I. Water supply: Fresh hot water in dedicated rinse tank.
160 II. Temperature: Not less than 180 degree F.
161 III. Ability to turn temperature tape if required.
162 c. Exhaust: Remove vapor saturated air from chamber.
163 d. Exposure Time: Exposure time of each treatment phase shall be factory pre-programmed
164 and unit shall be able to be re-programmed or adjusted during Commissioning.
165

166 2.04 CONSTRUCTION
167

- 168 A. Material:
169 1. Base and sump: Type 304 stainless steel, 12 gauge.
170 2. Door panels: Type 304 stainless steel, 16 gauge.
171 3. Exterior panels: Type 304 stainless steel, 14 gauge.
172 4. Spray header and jets: Type 304 Stainless Steel.
173 5. Pump housing and impeller: Type 316 stainless steel.
174 6. Process piping: Type 304 Stainless Steel.
175 7. Process valves: Type 316 Stainless Steel.
176 8. Steam coils: Type 304 stainless steel.
177 9. Internal steam piping: Type 304 Stainless steel.
178 10. Drain piping: Type 304 stainless steel.
179
180 B. Cabinet Assembly:
181 1. Chamber Wall: Stainless steel construction with reinforcement and insulation.
182 2. The wall assembly is fastened and sealed to the base to insure a watertight chamber.
183 3. Mechanical Area: Control system and mechanical system including tanks, pumps and service
184 connection valves shall be confined to an enclosed area on the side of chamber.
185 4. Exterior Enclosure: Stainless steel panel.
186 5. Provide access panels for equipment servicing where required.
187
188 C. Base:
189 1. Integral base frame and chamber sump construction.
190 2. Support Frame: Structural steel frame assembly capable of supporting integral sump.
191 3. Chamber Floor: Modular stainless steel removable grating panels.
192
193 D. Door(s):
194 1. Door Frame Construction: Double-skinned sandwich construction with reinforcement and

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

- 195 insulation.
- 196 2. Glass Panel: Full length tempered glass hinged door (mounted on a s/s reinforced frame
- 197 featuring a consolidated inflatable gasket solution.
- 198 a. Minimum Size: 77.5" Tall x 38.2" Wide
- 199 b. The glass must consist of two ¼" layers with Polyvinylbutyral film in between.
- 200 c. Doors (frames, glass and gaskets) to provide 100% air tight application, full vision inside
- 201 the chamber, and reduced noise and heat transmission when the machine is running.
- 202 d. During a standard cycle the maximum temperature measured on the external glass
- 203 cannot exceed 107°F.
- 204 e. The glass panel must be certified by an independent institute for compliance with UNI EN
- 205 81-1:2008, UNI EN 81-2:2008, UNI EN 12600:2004 in regards to crash resistance.
- 206 3. Door Gasket: Active inflating gasket pneumatically operated. A truly active gasket is required,
- 207 static gasket compression is unacceptable.
- 208
- 209 E. Chamber Lighting: Natural or Surface mounted LED
- 210
- 211 F. Day Tank Storage Area: Storage area built into technical vane for storage and secondary
- 212 containment of chemical day tank drums provided by others
- 213
- 214 G. Electrical Panel: Electrical panel to be a UL/CSA rated enclosure rated IP55/NEMA 4X
- 215

216 2.05 CONTROL SYSTEM

217

- 218 A. Hardware:
- 219 1. Standard, commercially available PLC control with operator interface control panel.
- 220 2. Standard USB Port at main control panel
- 221
- 222 B. System Features:
- 223 1. Controls washer function, monitors washer operation and alerts operator of alarm conditions
- 224 as it occurs or on demand.
- 225 2. Indicate alarm conditions in visual and audio mode.
- 226 3. Factory installed cycle phase time, temperature, alarms and other key operations settings.
- 227 4. Allow operating personnel to select from menu of pre-programmed cycle parameters.
- 228 5. Allow supervisor with pass code to modify pre-programmed cycle parameters.
- 229 6. Stores record of each cycle's operating characteristics in the control system and available for
- 230 download via USB communication port.
- 231 7. Cycle Program Memory: Up to 99 factory installed programs and custom named programs.
- 232 8. Lite View Interface: Allow access via Smartphone or Tablet app to mirror touchscreen
- 233 functions, view data, pass messages, and allow Supervisor access to setting and adjustment
- 234 of cycle settings.
- 235 9. Tele-Service: Must provide capability for secure remote service access to the PLC for the
- 236 purpose of providing remote troubleshooting services.
- 237 10. Self-start feature weekly programmable (day, time and cycle type)
- 238 11. Programming:
- 239 a. Military time expressed in minutes/seconds.
- 240 b. Fahrenheit or Centigrade temperature expressed in tenths of a degree increments.
- 241
- 242 C. Control Panel Features:
- 243 1. Microprocessor, PLC controller and electronic components shall be housed in insulated
- 244 control box

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

- 245 2. Control box is UL and CE compliant.
- 246 3. Main control panel at load end of washer.
- 247 4. Secondary control panels at load and un-load end of washer. Allows start cycle, open door,
- 248 and shows general alarm status only.
- 249 5. Operator interface:
 - 250 a. Backlit color touch screen LCD digital display.
 - 251 b. Control panel must be minimum 7" full color touchscreen.
 - 252 c. Language: English, French, and Spanish required.
- 253 6. Information display on control panel includes but is not limited to:
 - 254 a. Stored Cycle name for operator selection.
 - 255 b. Pre-programmed cycle parameter data.
 - 256 c. Real time in-process cycle performance data.

257
258 **2.06 MECHANICAL FEATURES**

- 259 A. Spray System:
 - 260 1. Jet-spray Manifolds, horizontally mounted oscillating arms in 120 degree sweeping pattern.
 - 261 2. Self-draining spray nozzles.
 - 262 3. Separate wash and rinse jet-spray nozzles.
 - 263 4. Spray nozzles shall be positioned to reach all cages and cart surfaces, including underside of
 - 264 shelves and base.
 - 265 5. Wash nozzles: Not less than 48 and no more than 84
 - 266 6. Rinse nozzles: Not less than 48
- 267 B. Water Tanks:
 - 268 1. Separate wash and rinse tank.
 - 269 2. Include top inspection latch.
 - 270 3. Equipped with level control, automatic fill, overflow safety and temperature control.
 - 271 4. Wash water tanks with radius corners and bottom slope to outlet.
 - 272 5. All tanks to be insulated and sealed.
- 273 C. Water Pumps:
 - 274 1. Wash pump:
 - 275 a. Deliver water from wash tank to washing circuit of jet-spray manifold.
 - 276 2. Rinse pump:
 - 277 a. Deliver fresh clean and pressurized water to rinse circuit of jet-spray manifold.
 - 278 b. Used rinse water to be returned to wash tank for re-use and conservation of heat load
- 279 D. Detergent Pump:
 - 280 1. Pneumatic diaphragm pump type.
 - 281 2. Equipped with sensor to detect level of chemical in the drums, and send an alarm signal to
 - 282 the PLC display when the drum is empty.
- 283 E. Steam Heating Coil:
 - 284 1. In water tanks as required.
 - 285 2. Equipped with condensate return and steam trap.
- 286 F. Self-Cleaning Filter:
 - 287 1. In-line installation type.
 - 288 2. Removable without tools

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

- 295 3. Must include sensor to prevent operation unless filter is re-installed correctly.
296 4. Filter: Stainless mesh with perforation smaller than jet-spray orifice.
297 5. Automatically flush every single washing cycle.

298
299 G. Valves: Pneumatically operated.

- 300
301 H. Exhaust Fan:
302 1. Extract vapor and condense from chamber during and at the end of cycle.
303 2. Variable Speed depending on cycle stage

304

305 2.07 OPTIONAL SYSTEM FEATURES

306

307 A. Additional Feature Options:

- 308 a. Additional Detergent Supply Dosing Pump: Provide additional dosing pump allowing for
309 the injection of an alternate chemical supply into the main wash tank.
310 b. Additional Rinse Circuit Dosing Pump: Provide additional dosing pump allowing for the
311 supply of a rinse aid or neutralizer to be added in-line to the rinse circuit

312

313 B. Drain Monitoring Options:

- 314 a. Drain Discharge Cool-Down System: Reduce effluent discharge to less than 140 degrees
315 F by supplying cold water to drain release point.
316 b. Drain Discharge pH Balancing System: Balance effluent discharge to a programmable pH
317 range (Default 6-9) by supplying balancing agent at discharge point.

318

319 2.08 SAFETY FEATURES

320

321 A. Safety Door Switch:

- 322 1. Requires doors to be completely closed to start or continue operation.
323 2. Stops operation if door is opened during operation.
324 3. Electro-mechanic pumps shut off when door open

325

326 B. Emergency Stop:

- 327 1. External emergency push buttons near each door to stop operation.
328 2. Interior emergency push bar on side of interior wash chamber.
329 3. Emergency Signage Provide per AALAC Requirements
330 4. When internal e-stop is pushed, system must allow free and easy egress with no additional
331 steps required to release a door.

332

333 C. Door Interlocks:

- 334 1. Safety mechanism to prevent doors on both ends from being opened simultaneously during
335 normal operations.

336

337 D. Chamber Overpressure Device: Chamber must be outfitted with pressure release device
338 preventing overpressure situation inside the chamber.

339

340 2.09 UTILITIES

341

342 A. Provide unit with the utilities listed below.

343

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

Utility/ Service Required	Steam Heated Model
Main Power	480V/ 60Hz / 3-phase FLA: 28.4A Main Switch: 40A Fusible Disconnect Req'd: 45A
Secondary Power*	115V / 60Hz / Single Phase 30A
Softened Water (Main Supply)	29-44 PSI 59-140 F 1"NPT 50ppm < CaCO3 <120ppm
Cold Water*	29-44 PSI 59-68 F ½ "NPT
Steam	44-72 PSI Min Flow Rate: 330 lbs/hr 1 ¼" NPT Filtered, and Dry
Clean Steam*	44-72 PSI Min Flow Rate: 551 lbs/hr 1" NPT Autoclave Quality, Filtered, and Dry
Condensate	Pressure/Flow: Same as incoming steam ¾" NPT
Compressed Air	87 PSI 1.25 CFM 1/2" NPT
Exhaust	590 CFM 7 3/32" Flange
Data	Ethernet RJ45 Connector Static IP Address Req'd

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PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

- 349 A. Verification of Conditions:
350 1. Verify that space rough-in dimensions are as indicated.
351 2. Examine surfaces designated to receive work for conditions that would adversely affect the finished
352 work.
353 3. Inspect and verify that required utilities are available, in proper location, and ready for use prior to
354 equipment installation.
355
356 B. Proceed with Work when conditions shall permit work to be installed in accordance with original design,
357 accepted submittals, and manufacturer's printed instructions. Commencement of work indicates
358 acceptance of substrate conditions.
359

360 3.02 INSTALLATION

- 361 A. Installation Sequence: shall allow for continuous vivarium operations.
362 B. Final utility connections shall be performed by on-site General Contractor.
363 C. Interface with Other Products: Coordinate for proper installation of mechanical, plumbing and
364 electrical services.
365
366

367 3.03 FIELD TESTING, DEMONSTRATION AND TRAINNING

- 368
369 A. Site Commissioning
370 1. Perform after completion of installation.
371 2. Perform by manufacturer's personnel.
372 3. Witness by Customer's representatives.
373 4. Turn over equipment to Customer's in an approved condition and:
374 a. When agreed functional tests have been executed and approved.
375 b. After test running and notification by the manufacturer.
376
377 B. Manufacturer shall provide on-site training.
378
379 C. Training shall include but not be limited to the following:
380 1. Operator/Basic Training:
381 a. For Customer's personnel required to operate the system.
382 b. Course description includes but shall not be limited to:
383 I. Overall system description.
384 II. Safety regulations.
385 III. Start up and shut down of the System.
386 IV. System documentation.
387 V. Trouble shooting and error handling.
388
389 2. Maintenance Training:
390 a. For operation supervisor and facility's maintenance personnel.
391 b. In addition to items listed under Operator/Basic Training, this course includes, but shall not be
392 limited to:
393 I. Manufacturer's maintenance services.
394 II. Maintenance required.
395 III. Control system program survey.
396 IV. Change control system program parameters.
397 V. Spare parts list.
398 VI. Spare parts kit.

RENOVATIONS AT 700 RESEARCH CENTER BOULEVARD FOR:
UA ANIMAL FACILITY (CLAF)

399

4003.04 CLEANING AND PROTECTION

401

402

A. Clean work area and dispose of spent materials on daily basis.

403

B. Touch up and restore any factory finishes damaged during delivery and installation. Repair, remove and replace defective work as approved by the Customer's representative.

404

405

C. Protect materials and installed equipment from damage caused by subsequent construction operations until final acceptance by Customer.

406

407

408

409

END OF SECTION xxxxx



Atlantis Easy Series Tecniplast/IWT Washer(s)

Basis of Design Features

- Wash water consumption must be maximum 20 gallons / cycle while maintaining validated microbiological cleanliness
- Must have microbiologically validated cycle performance that requires only a single rinse phase.
- Must be AK KAB certified for cleaning and decontamination of:
 1. Cage Bases
 2. Wire Bar Lids
 3. IVC Racks
 4. Transport rack
- Must be Egnaton certified for sustainable validated performance showing that validated results can be reliably repeated over and over again.
- Must require maximum 6" pit requirement
- Must have independent wash and rinse circuits with independent wash and rinse nozzles
- Must be able to produce validated washing result using maximum (3) oscillating wash arms on each side of the wash chamber
- Each oscillating wash arm must be capable of providing 120 degrees of movement
- Wash sump and rinse side tank; recaptures 180-degree rinse water for wash cycle which continuously heats the wash water and shortens the cycle time - energy efficiency.
- Must be all stainless-steel construction - never using black pipe, mild steel or copper.
- Must use Tri Clamp connections
- Must have tool less In-line Self Cleaning – Backflush Debris Filter
- Must be capable of a 10-minute wash cycle that can turn temp tapes. High efficiency washer (6 cycles / hour) for rodents.
- Must have inflatable Gaskets on both doors creating a completely sealed, biocontained chamber

- Must be capable of 100% exhaust extraction through the HVAC exhaust at the end of the wash cycle
- Must recirculate wash water back into the wash sump resulting in a reduction in detergent consumption.
- Must have compact and easily accessible Utility Area. Maximum Pit dimensions required are: 95.28" (W) x 99.61" (L) x 6" (D).
- Must be assembled using pre-constructed and palletized utility sections (pumps and connections already assembled, etc.) translate to reduced install time and cheaper install cost - plug and play palletized utility sections
- Machine must have a 3-year warranty
- Must have 7" Full Color Touch Screen - Polaris with Standard LiteView Interface and Teleservice
- Must have a Full Glass Door with 3rd Party Certification verifying crash resistance
 1. During a standard cycle the maximum temperature measured on the external glass cannot exceed 107°F.
 2. The glass panel must be certified by an independent institute for compliance with UNI EN 81-1:2008, UNI EN 81-2:2008, UNI EN 12600:2004 in regards to crash resistance.
- Electrical Panel: Electrical panel must be a UL/CSA rated enclosure rated IP55/NEMA 4X
- Must be a rack washer model that has been available in the North American market for minimum 5 years.
- Must be a rack washer that has a minimum 15 previous installation in the United States market



SUBSTITUTION REQUEST

Project: University of AR Animal Facility Substitution Request Number: N/A

 From: Roofing System Solutions, LLC
 To: Project Manager Date: 1/27/20

 A/E Project Number: N/A
 Re: Silicone Substitution Request Contract For: _____

Specification Title: Silicone Roof Coating Restoration System Description: Materials/Manufacturer
 Section: 075600 Page: 6 Article/Paragraph: 2.02.A.1 / 2.02.B.1 / 2.03.A.1

Proposed Substitution: 502RCW Elasto Kote/ 505WB KarnaFlex Seam Sealer / 405 Asphalt Surface Base Coat
 Manufacturer: Karnak Address: Clark, NJ Phone: 800-526-4236
 Trade Name: N/A Model No.: N/A

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Tim Reed

 Signed by: 
 Firm: Roofing System Solutions, LLC
 Address: P.O. Box 30355
Edmond, OK 73003
 Telephone: 405-650-8915 email: tim@rssproducts.com

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01330.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: **Seth Spradlin (DEMX)**

Date: **1/30/2020**

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

502 RC-W Elasto Kote (Base & Finish)

DESCRIPTION:

KARNAK 502 RC-W Elasto-Kote is a highly elastic, thermoplastic-rubber, single component, exterior waterproofing coating.

USES:

502 RC-W Elasto-Kote is intended for use on metal roofs, spray polyurethane foam roofs, EPDM, TPO, and most PVC roof membranes. Also good over previously coated surfaces as well as for coating concrete, concrete block, brick, cinder block, stucco and wood. **Do not apply over asphaltic surfaces due to the likelihood of asphalt bleed through.** PVC and TPO roofs should be at least 4 years old before coating.

SURFACE PREPARATION:

All roof surfaces to be coated should be clean and free of dirt, dust flaking and pitting rust, grease, oil, and loose paint. New metal must be allowed to age 30 days and new masonry surfaces should be allowed to cure 30 days, before coating. EPDM roof surfaces should be cleaned with 507 SPC Primer/Wash. Other single ply membranes should be cleaned with 799 Wash-N-Prep Roof Cleaner and water. Patch and repair all seams, flashings with 502MS Karna-Flex and Resat-Mat or 550 Patch-N-Go or appropriate sealants and caulking materials. Contact KARNAK Technical Services at 800-526-4236 for questions regarding surface preparation.

APPLICATION:

502 RC-W Elasto-Kote Base and Finish may be applied by brush, roller or spray equipment.

COVERAGE RATE:

Apply 502 RC-W Elasto-Kote Base at the rate of 1.5 gallons per 100 sq. ft. Allow base to dry 24 hours before applying 502 RC-W Elasto-Kote Finish at the rate of 1.5 gallons per 100 sq. ft. Coverage rate will vary due to texture and porosity of the surface. Film thickness should be approximately 18-20 mils dry. 502 RC-W Elasto-Kote Finish will take approximately 24 hours to cure. EPDM roofs should first be coated with 502 RC-W Base at the rate of 0.5 gallons per 100sq. ft. followed by two coats of 502 RC-W Elasto-Kote Finish at 1-1.5 gallons per 100 sq. ft. per coat.

ARCHITECTURAL COLORS:

Standard colors are White, Gray, Khaki Tan, Red and Patina Green. Other available colors require minimum order quantity of 210 gallons.

PHYSICAL PROPERTIES:

Weight Per Gallon	9.3 lbs.
Permeability:	0.01 Perm
Solids by Weight	50%
Solids by Volume:	40%



NSF Protocol P151
Health Effects from Rainwater
Catchment System Components



KARNAK

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732-388-0300 • 800-526-4236 • FAX: 732-388-9422
WEB: <http://www.karnakcorp.com>



502 RC-W Elasto Kote (Base & Finish)

Color:	Finish Coat – White/Selected color, Base Coat - Gray
Hardness Shore A:	65
Elongation:	715% (nominal) - ASTM D2370
Tensile Strength:	1182 psi (nominal) - ASTM D2370
Water Absorption (7 days):	0.4%
Dry Time (To Touch):	4 to 6 hours @ 77°F 50% relative humidity
Application Temperature Range:	40°F - 120°
Service temperature Range:	-15°F - 180°F
Cure Time:	12 to 24 hours @ 77°F 50% relative humidity

Cool Roof Rating Council (CRRC) - White

1. Solar Reflectance:	Initial	0.85	3 year	0.72
2. Thermal Emittance:	Initial	0.89	3 year	0.92
3. SRI:	Initial	107	3 year	89

CAUTION:

Do not use near open flame. Avoid breathing solvent fumes and prolonged contact with skin. Do not take internally. If swallowed, **do not induce vomiting**. Call a physician immediately. Keep out of reach of children. Keep container covered when not in use. **Do not thin**. Dispose of in an environmentally safe manner. Cover air intakes during application and while drying.

PACKAGING:

Available in 5 gallon pails and 55 gallon drums.

NOTE: COLD-PROCESS SYSTEMS AND COATINGS, EITHER EMULSION OR SOLVENT BASED, SHOULD ONLY BE INSTALLED ON DECKS WITH POSITIVE DRAINAGE.

PER NRCA, (NATIONAL ROOFING CONTRACTORS ASSOCIATION) "THE CRITERIA FOR JUDGING PROPER SLOPE FOR DRAINAGE IS THAT THERE BE NO EVIDENCE OF STANDING WATER ON THE DECK 48 HOURS AFTER IT STOPS RAINING."

If further information is needed, contact KARNAK Technical Services at 1-800-526-4236.

When installed properly, this product will help reduce energy costs. Actual savings will vary based on geographical location and individual building characteristics. Consult your product manufacturer, roofing contractor, or call 1-888-STAR-YES (1-888-782-7937) for more information.



NSF Protocol P151
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505MS Karna-Flex WB

DESCRIPTION:

505MS Karna-Flex WB is an acrylic elastomeric, water-borne mastic formulated for use on built-up asphalt roofing, modified bitumen membranes and properly prepared metal, concrete, spray polyurethane foam and plywood roof substrates. Its ease of application, superior adhesion, elasticity and durability make Karna-Flex WB an ideal repair sealant.

FEATURES, BENEFITS AND ADVANTAGES:

- White elastomeric sealant
- Easy application by brush or bulk loading caulking gun.
- Excellent adhesion to many surfaces.
- Sets up quick for coating over.
- Low temperature flexibility—specially selected polymers and resins impart superior low temperature properties to the coating.
- Low VOC, water-based, no odor.
- Resistant to mold and mildew growth.
- UV stable, may be left exposed.

USES:

505MS Karna-Flex WB's elastomeric properties make it an excellent sealant for making repairs to built-up asphalt roofs, modified bitumen membrane roofs, prepared metal, concrete, spray polyurethane foam and plywood roof system details. Ideal for sealing flashings, curbs and waterproofing metal roof seams, gutters, fasteners, pinholes in metal and skylights. Excellent for sealing flashings on asphalt BUR roofs and modified bitumen membrane roofs. Ideal for sealing around penetrations and roof top equipment. Use in place of flashing cement for repairs to all types of asphalt roofs prior to applying white coatings.

SURFACE PREPARATION:

All surfaces to be sealed must be dry, clean and free from rust, loose coating and caulk, oil, grease and other foreign matter. Remove silicone or other sealants before using.

APPLICATION: General Repairs

505MS Karna-Flex WB should be applied by stiff brush or bulk loading caulking gun, depending on the application. Apply sealer when temperatures are above 40°F and rain is not forecasted within 24 hours.

For sealing flashings and lap seams use fabric reinforcement between layers of 505MS Karna-Flex WB. Apply sealer in a 1/16" to 1/8" width then immediately embed 5540 Resat-Mat fabric into the wet coating. Smooth out fabric then

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505MS Karna-Flex WB

apply another layer of sealer. Some shrinkage may occur and require an additional application of 505MS Karna-Flex WB.

For metal roofing follow these application guidelines:

1. Horizontal Seams and Cracks 1/16" wide or larger
 - Using 550 Patch-N-Go Fleece Tape, adhere tape to crack as directed per product application guidelines. Apply 505MS Karna Flex WB at an average thickness of 1/16" to completely cover the polyester face of the tape and feather out.
 - Using 5540 Resat-Mat, apply a 1/16" thick application of 505MS Karna-Flex WB then immediately embed one ply or Resat-Mat fabric into the wet coating. Smooth out fabric then apply another layer of 505MS Karna-Flex WB.
2. Screws/Fasteners, Vertical Seams and Cracks less than 1/16"
 - Over screws and fasteners apply a dollop of 505MS Karna-Flex WB to completely enclose the screw/fastener with either a 2" wide brush or bulk loading caulking gun.
 - Over vertical seams and cracks less than 1/16" wide, back brush a minimum 2" wide application of 505MS Karna-Flex WB at an appropriate thickness of 1/16" to 1/8".

Allow to cure 24 hours before applying any coatings over. Not intended for use in areas that pond water.

PHYSICAL PROPERTIES:

Weight per Gallon:	11.8 lbs.
%NV by Weight:	70%
%NV by Volume:	65%
Color:	White
VOC:	Please visit www.karnakcorp.com for latest VOC content as products are updated to comply with the most current VOC regulations
Tensile Strength:	40 psi.
Elongation:	500%
Low Temp Flex:	ASTM-C-734: Pass / No Cracking
Recovery:	75% min.

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505MS Karna-Flex WB

CAUTION:

Material is for building exterior applications only. Do not apply when rain is imminent. Protect from freezing. Sealant must be dried before exposure to water. Do not take internally. If swallowed, do not induce vomiting. Call a physician immediately. KEEP OUT OF REACH OF CHILDREN. Keep container covered when not in use. Do not thin. Dispose of in an environmentally safe manner. Cover air intakes during application and while drying. Not for use on areas that pond water, roofs should have positive drainage.

PACKAGING:

30 oz. caulking cartridges; 1 gallon, 3.5 gallon and 5 gallon pails.

If further information is needed, contact KARNAK Technical Services at 1-800-526-4236.

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405 Bond-N-Shield (Asphalt Surface Base Coat)

DESCRIPTION:

KARNAK 405 Bond-N-Shield is a 100% elastomeric acrylic, co-polymer emulsion, specifically designed as a base coating that will provide excellent adhesion to asphalt surfaces. The coating contains stain blockers that prevent asphalt bleed through thus producing a brighter white coating over these surfaces. Technological advances in the KARNAK laboratory also give this acrylic coating improved water blistering resistance in temporary ponding areas versus traditional acrylic coatings.

USES:

405 Bond-N-Shield is intended for use as a base coat prior to the application of 501 Elasto-Brite, 505HS Mohave Coat, 529 Renu-White, 535QS Enviro-Lastic, acrylic topcoats as well as 670HS Karna-Sil Ultra and 670LS Karna-Sil silicone coatings on built-up roof surfaces that have aged a minimum of 90 days and SBS and APP smooth and granular modified membranes that have weathered 30 days.

SURFACE PREPARATION:

Surfaces to be coated should be dry, clean, and free of dirt, dust, grease, oil and loose paint. Power wash surfaces with 799 Wash-N-Prep Roof Cleaner and water. Wash roof surfaces with a minimum of 2000 psi., taking all necessary precautions to avoid damage to the roof system. Patch and repair cracks or holes with 505MS Karna-Flex WB and Resat-Mat or Poly-Mat or appropriate sealants or caulking materials. All wet insulation should be removed and replaced with like materials. New BUR roof surfaces must age a minimum of 90 days before coating. SBS and APP modified bitumen membranes should weather 30 days before coating.

APPLICATION:

Mix lightly prior to application of the coating. 405 Bond-N-Shield may be applied by brush, spray equipment or roller. For applications in higher temperatures (above 90 °F) KARNAK recommends application in multiple thin coats to prevent trapped moisture problems. Commencement of work by the contractor implies his approval of the deck surface.

BRUSH / ROLLER APPLICATION:

Brush / roller application should be done applying the coating in the same direction. Apply the finish coat perpendicular to 405 Bond-N-Shield.

SPRAY APPLICATION:

Utilize a standard paint spray pump or airless spray pump. Equipment manufacturer should be consulted for more complete information. Spray application should be done with a 50% over-spray pattern.

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WEB: <http://www.karnakcorp.com>

405 Bond-N-Shield (Asphalt Surface Base Coat)

COVERAGE RATE:

Apply 405 Bond-N-Shield over the surface at the rate of 1.5 gallons per 100 sq. ft. Allow dry 6-24 hours then apply the selected finish coating. The total dry mil thickness of 405 Bond-N-Shield and finish coating should be minimum of 20 to 24 mils. Coverage will vary depending on the surface to be coated.

PHYSICAL PROPERTIES:

Weight per Gallon:	11.4 lbs.	
Viscosity:	34,000 cps	ASTM D2196 Method A
Solids by Weight:	65%	
Solids by Volume:	53%	
Color:	Light Blue	
Hardness Shore A:	60	
Elongation:	800%	ASTM D2370
Tensile Strength:	249 PSI	ASTM D2370
Tear Resistance:	83 lbf/in	ASTM D624
Weathering:	Excellent	
Permeability:	3.0 Perms	

CAUTION:

Do not apply when rain is imminent. Coating must be dried before exposure to water. Store in a heated room and keep container covered when not in use. Do not thin. Keep out of reach of children. Avoid prolonged contact with skin. Dispose of in an environmentally safe manner. Cover air intakes during application and while drying.

COLD-PROCESS SYSTEMS AND COATING, EITHER EMULSION OR SOLVENT BASED, SHOULD ONLY BE INSTALLED ON DECKS WITH POSITIVE DRAINAGE.

PER NRCA, (NATIONAL ROOFING CONTRACTORS ASSOCIATION, "THE CRITERIA FOR JUDGING PROPER SLOPE FOR DRAINAGE IS THAT THERE BE NO EVIDENCE OF STANDING WATER ON THE DECK 48 HOURS AFTER IT STOPS RAINING."

PACKAGING:

Available in 5 gallon pails and 55 gallon drums.

If further information is needed, contact KARNAK Technical Services at 1-800-526-4236.

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SUBSTITUTION REQUEST

Project: University of AR Animal Facility Substitution Request Number: N/A
 From: Roofing System Solutions, LLC
 To: Project Manager Date: 1/27/19
 A/E Project Number: N/A
 Re: Silicone Substitution Request Contract For: _____

Specification Title: Silicone Roof Coating Restoration System Description: Materials/Manufacturer
 Section: 075600 Page: 6 Article/Paragraph: 2.02.A.1 / 2.02.B.1 / 2.03.A.1

Proposed Substitution: 670 HS Silicone / 505WB KarnaFlex Seam Sealer / 405 Asphalt Surface Base Coat
 Manufacturer: Karnak Address: Clark, NJ Phone: 800-526-4236
 Trade Name: N/A Model No.: N/A

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Tim Reed

 Signed by: _____
 Firm: Roofing System Solutions, LLC
 Address: P.O. Box 30355
Edmond, OK 73003
 Telephone: 405-650-8915 email: tim@rssproducts.com

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01330.
 Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
 Substitution rejected - Use specified materials.
 Substitution Request received too late - Use specified materials.

Signed by: **Seth Spradlin (DEMX)**

Date: **1/30/2020**

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

670HS Karna-Sil Ultra (High Solids, very low VOC Silicone Coating)

DESCRIPTION:

KARNAK 670HS Karna-Sil Ultra is a white, single component, high solids, moisture curing silicone coating that produces a durable elastic coating with exceptional weathering and water resistance characteristics.

USES:**Newly Sprayed Poly-Urethane Foam or Previously Coated Silicone roofs****(No Primer required):**

Apply 670HS Karna-Sil Ultra directly over newly sprayed polyurethane foam, or pressure-washed, clean and dry Silicone coated roofs.

Metal, Concrete, Masonry, TPO, PVC, Hypalon, and EPDM roofs (Requires Epoxy Primer):

Pressure-wash roof, and let dry prior to primer application. Apply 180 Karna-Sil Epoxy Primer and allow to cure before applying 670HS Karna-Sil Ultra.

BUR (Built-Up) and Modified Bitumen (Requires Epoxy Primer or 405 Base Coat):

Pressure-wash roof, and let dry prior to primer application. Apply either 180 Karna-Sil Epoxy Primer or 405 Bond-N-Shield acrylic base coat and allow to cure before applying 670HS Karna-Sil Ultra.

670HS may be used on vertical as well as horizontal applications. All surfaces must have positive drainage. **Note:** Vertical application may require multiple coats to achieve desired film thickness.

SURFACE PREPARATION:

Surfaces to be coated should be dry, clean, and free of dirt, dust, grease, oil and loose rust or coating. Recommended application temperature is 50°F to 120°F. Power wash surfaces with 799 Wash-N-Prep Roof Cleaner or 507 SPC Primer/Wash (EPDM Only) and water. Wash roof surfaces with a minimum of 2000 psi. taking all necessary precautions to avoid damage to the roof system. Patch and repair all seams, flashings, damaged areas, leak and cracks with 502MS Karna-Flex, 505MS Karna-Flex WB, 550 Patch-N-Go self-sealing tape or appropriate sealants or caulking materials.

APPLICATION:

670HS Karna-Sil Ultra should be applied in a single coat application at the required application rate. If additional coats are to be applied, allow previous coat to cure 2-8 hours (dependent upon temperature and humidity) before applying subsequent coat. Subsequent coats should be applied within 24 hours of previous application to ensure uniform adhesion. Applied coating film should be even and free of pinholes. Coverage will vary depending on the surface to be coated. To improve aesthetics, impact resistance and toughness of the coating, ceramic roofing granules should be applied immediately into the final coat after application. Back-roll granules into coating and allow to cure then blow off or sweep loose granules from the surface.

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670HS Karna-Sil Ultra (High Solids, very low VOC Silicone Coating)

Mix coating prior to application with a 3" diameter mixer (5-gallon pail) or 6" diameter mixer (50 gallon drum). Once product is mixed, the entire container should be used. 670HS Karna-Sil

Ultra may be applied by brush, roller or airless spray equipment. Apply at temperatures 50°F to 120°F. Do not apply if rain is expected within 24 hours after application. Commencement of work by the contractor implies their approval of the roof surface. See listing at www.nsf.org for application and cure instructions for rainwater catchment use.

SPRAY APPLICATION:

For spray application, a high-pressure airless spray unit with a minimum of 3500 psi working pressure at the gun tip should be used. The pump must have a 3 gallon per minute output. Hoses should be jacketed for prevention of moisture contamination. Hoses should have a 3/4" ID and tip size should be a minimum size 0.030 orifice. Do not use with hoses that have been used to spray acrylic coatings.

COVERAGE RATE:

Apply in a single coat at 1.5 gallons per 100 sq. ft. to yield approximately 23 dry mils.

SPECIFICATIONS:

ASTM D-6694

PHYSICAL PROPERTIES:

Weight per Gallon	10.7 lbs.	
Solids by Weight:	96%	ASTM D-1644
Solids by Volume:	96 %	ASTM D-2697
Color:	White	
Reflectivity	Initial 0.87	ASTM C-1549
	Aged 0.70	ASTM C-1549
Emissivity	Initial 0.89	ASTM C-1371
	Aged 0.90	ASTM C-1371
Initial SRI:	110	
Aged SRI:	86	
Hardness Shore A:	50	ASTM D-2240
Elongation:	192% at 73°F	ASTM D-2370
	216% at 0°F	ASTM D-2370
Tensile Strength:	331 PSI at 73°F	ASTM D-2370
	432 PSI at 0°F	ASTM D-2370
Tear Resistance:	26 PSI	ASTM D-624
Application temperature:	50°F to 120°F	

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670HS Karna-Sil Ultra (High Solids, very low VOC Silicone Coating)

Storage temperature:	50°F - 90°F	Dry environment
Permeance:	5.9 perms	ASTM E-96
Service Temperature:	-15°F to 180°F	
Cure Time:	2-8 hrs.	(Temp. & Humidity Dependent)
Shelf Life (Unopened):	12 months	(Stored at 35°F - 75°F)

Cool Roof Rating Council (CRRC) - White

1. Solar Reflectance:	Initial	0.87	3 year	0.70
2. Thermal Emittance:	Initial	0.89	3 year	0.90
3. SRI:	Initial	110	3 year	86

VOC Content:

Please visit www.karnakcorp.com for latest VOC content as products are updated to comply with the most current VOC regulations.

CAUTION:

Pumping equipment should be grounded to avoid accidental ignition due to static sparks. Avoid breathing solvent vapors. Use with appropriate MESA/NIOSH approved respirator when exposure can exceed recommended PEL. Not for interior use. Do not apply when rain is imminent. Keep containers properly sealed when stored indoors, in a cool well-ventilated area. Keep containers away from moisture. Keep away from heat, sparks and open flame. Do not store above 100°F. Do not thin. Keep out of reach of children. Avoid prolonged contact with skin. Dispose of in an environmentally safe manner. Cover air intakes during application and while drying. Please refer to MSDS for more safety information.

COLD-PROCESS SYSTEMS AND COATING, EITHER EMULSION OR SOLVENT BASED, SHOULD ONLY BE INSTALLED ON DECKS WITH POSITIVE DRAINAGE.

PER NRCA, (NATIONAL ROOFING CONTRACTORS ASSOCIATION, "THE CRITERIA FOR JUDGING PROPER SLOPE FOR DRAINAGE IS THAT THERE BE NO EVIDENCE OF STANDING WATER ON THE DECK 48 HOURS AFTER IT STOPS RAINING."

PACKAGING:

Available in 5 gallon pails and 50 gallon drums

APPROVED BY:



If further information is needed, contact KARNAK Technical Services at 1.800.526.4236.

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505MS Karna-Flex WB

DESCRIPTION:

505MS Karna-Flex WB is an acrylic elastomeric, water-borne mastic formulated for use on built-up asphalt roofing, modified bitumen membranes and properly prepared metal, concrete, spray polyurethane foam and plywood roof substrates. Its ease of application, superior adhesion, elasticity and durability make Karna-Flex WB an ideal repair sealant.

FEATURES, BENEFITS AND ADVANTAGES:

- White elastomeric sealant
- Easy application by brush or bulk loading caulking gun.
- Excellent adhesion to many surfaces.
- Sets up quick for coating over.
- Low temperature flexibility—specially selected polymers and resins impart superior low temperature properties to the coating.
- Low VOC, water-based, no odor.
- Resistant to mold and mildew growth.
- UV stable, may be left exposed.

USES:

505MS Karna-Flex WB's elastomeric properties make it an excellent sealant for making repairs to built-up asphalt roofs, modified bitumen membrane roofs, prepared metal, concrete, spray polyurethane foam and plywood roof system details. Ideal for sealing flashings, curbs and waterproofing metal roof seams, gutters, fasteners, pinholes in metal and skylights. Excellent for sealing flashings on asphalt BUR roofs and modified bitumen membrane roofs. Ideal for sealing around penetrations and roof top equipment. Use in place of flashing cement for repairs to all types of asphalt roofs prior to applying white coatings.

SURFACE PREPARATION:

All surfaces to be sealed must be dry, clean and free from rust, loose coating and caulk, oil, grease and other foreign matter. Remove silicone or other sealants before using.

APPLICATION: General Repairs

505MS Karna-Flex WB should be applied by stiff brush or bulk loading caulking gun, depending on the application. Apply sealer when temperatures are above 40°F and rain is not forecasted within 24 hours.

For sealing flashings and lap seams use fabric reinforcement between layers of 505MS Karna-Flex WB. Apply sealer in a 1/16" to 1/8" width then immediately embed 5540 Resat-Mat fabric into the wet coating. Smooth out fabric then

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505MS Karna-Flex WB

apply another layer of sealer. Some shrinkage may occur and require an additional application of 505MS Karna-Flex WB.

For metal roofing follow these application guidelines:

1. Horizontal Seams and Cracks 1/16" wide or larger
 - Using 550 Patch-N-Go Fleece Tape, adhere tape to crack as directed per product application guidelines. Apply 505MS Karna Flex WB at an average thickness of 1/16" to completely cover the polyester face of the tape and feather out.
 - Using 5540 Resat-Mat, apply a 1/16" thick application of 505MS Karna-Flex WB then immediately embed one ply or Resat-Mat fabric into the wet coating. Smooth out fabric then apply another layer of 505MS Karna-Flex WB.
2. Screws/Fasteners, Vertical Seams and Cracks less than 1/16"
 - Over screws and fasteners apply a dollop of 505MS Karna-Flex WB to completely enclose the screw/fastener with either a 2" wide brush or bulk loading caulking gun.
 - Over vertical seams and cracks less than 1/16" wide, back brush a minimum 2" wide application of 505MS Karna-Flex WB at an appropriate thickness of 1/16" to 1/8".

Allow to cure 24 hours before applying any coatings over. Not intended for use in areas that pond water.

PHYSICAL PROPERTIES:

Weight per Gallon:	11.8 lbs.
%NV by Weight:	70%
%NV by Volume:	65%
Color:	White
VOC:	Please visit www.karnakcorp.com for latest VOC content as products are updated to comply with the most current VOC regulations
Tensile Strength:	40 psi.
Elongation:	500%
Low Temp Flex:	ASTM-C-734: Pass / No Cracking
Recovery:	75% min.

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505MS Karna-Flex WB

CAUTION:

Material is for building exterior applications only. Do not apply when rain is imminent. Protect from freezing. Sealant must be dried before exposure to water. Do not take internally. If swallowed, do not induce vomiting. Call a physician immediately. KEEP OUT OF REACH OF CHILDREN. Keep container covered when not in use. Do not thin. Dispose of in an environmentally safe manner. Cover air intakes during application and while drying. Not for use on areas that pond water, roofs should have positive drainage.

PACKAGING:

30 oz. caulking cartridges; 1 gallon, 3.5 gallon and 5 gallon pails.

If further information is needed, contact KARNAK Technical Services at 1-800-526-4236.

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405 Bond-N-Shield (Asphalt Surface Base Coat)

DESCRIPTION:

KARNAK 405 Bond-N-Shield is a 100% elastomeric acrylic, co-polymer emulsion, specifically designed as a base coating that will provide excellent adhesion to asphalt surfaces. The coating contains stain blockers that prevent asphalt bleed through thus producing a brighter white coating over these surfaces. Technological advances in the KARNAK laboratory also give this acrylic coating improved water blistering resistance in temporary ponding areas versus traditional acrylic coatings.

USES:

405 Bond-N-Shield is intended for use as a base coat prior to the application of 501 Elasto-Brite, 505HS Mohave Coat, 529 Renu-White, 535QS Enviro-Lastic, acrylic topcoats as well as 670HS Karna-Sil Ultra and 670LS Karna-Sil silicone coatings on built-up roof surfaces that have aged a minimum of 90 days and SBS and APP smooth and granular modified membranes that have weathered 30 days.

SURFACE PREPARATION:

Surfaces to be coated should be dry, clean, and free of dirt, dust, grease, oil and loose paint. Power wash surfaces with 799 Wash-N-Prep Roof Cleaner and water. Wash roof surfaces with a minimum of 2000 psi., taking all necessary precautions to avoid damage to the roof system. Patch and repair cracks or holes with 505MS Karna-Flex WB and Resat-Mat or Poly-Mat or appropriate sealants or caulking materials. All wet insulation should be removed and replaced with like materials. New BUR roof surfaces must age a minimum of 90 days before coating. SBS and APP modified bitumen membranes should weather 30 days before coating.

APPLICATION:

Mix lightly prior to application of the coating. 405 Bond-N-Shield may be applied by brush, spray equipment or roller. For applications in higher temperatures (above 90 °F) KARNAK recommends application in multiple thin coats to prevent trapped moisture problems. Commencement of work by the contractor implies his approval of the deck surface.

BRUSH / ROLLER APPLICATION:

Brush / roller application should be done applying the coating in the same direction. Apply the finish coat perpendicular to 405 Bond-N-Shield.

SPRAY APPLICATION:

Utilize a standard paint spray pump or airless spray pump. Equipment manufacturer should be consulted for more complete information. Spray application should be done with a 50% over-spray pattern.

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405 Bond-N-Shield (Asphalt Surface Base Coat)

COVERAGE RATE:

Apply 405 Bond-N-Shield over the surface at the rate of 1.5 gallons per 100 sq. ft. Allow dry 6-24 hours then apply the selected finish coating. The total dry mil thickness of 405 Bond-N-Shield and finish coating should be minimum of 20 to 24 mils. Coverage will vary depending on the surface to be coated.

PHYSICAL PROPERTIES:

Weight per Gallon:	11.4 lbs.	
Viscosity:	34,000 cps	ASTM D2196 Method A
Solids by Weight:	65%	
Solids by Volume:	53%	
Color:	Light Blue	
Hardness Shore A:	60	
Elongation:	800%	ASTM D2370
Tensile Strength:	249 PSI	ASTM D2370
Tear Resistance:	83 lbf/in	ASTM D624
Weathering:	Excellent	
Permeability:	3.0 Perms	

CAUTION:

Do not apply when rain is imminent. Coating must be dried before exposure to water. Store in a heated room and keep container covered when not in use. Do not thin. Keep out of reach of children. Avoid prolonged contact with skin. Dispose of in an environmentally safe manner. Cover air intakes during application and while drying.

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PACKAGING:

Available in 5 gallon pails and 55 gallon drums.

If further information is needed, contact KARNAK Technical Services at 1-800-526-4236.

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2/5/18

LAB DESIGN

LABORATORY CASEWORK SYSTEMS

P.O. BOX 1238 * BURLINGTON, NJ 08016 * (609) 387-7580 * FAX (609) 387-0803

LABORATORY CASEWORK SPECIFICATIONS

1. Tool less Free Removable Back Panels that have built in Glides to slide Panel Back on.
 2. All Cabinets Over 24" Wide Must Have (2) Removable Back Panels.
 3. Cabinet to be Pre-Punched and drilled to except any Configuration of Components. All Allow Cabinet to be altered after Installation.
 4. All Doors Must be Reversible, so they can be Hinged Left or Right after Cabinet Installation.
 5. All Cabinet Doors and Drawers must have Knockouts to add locks at future time.
 6. Bases on Cabinet are to be separate, not integral, for ability to remove Base.
 7. Delivery for all components must be less than 35 days or Penalty Clause will be applied.
 8. Product to be 100% American Made.
- 1. BASE UNITS MUST BE AVAILABLE IN 18", 24", 29", 35", 41", & 47" WIDTHS. ALL CASEWORK MUST BE ABLE TO BE RECONFIGURED IN THE FIELD W/ HAND TOOLS ONLY. ALL BASE UNITS HAVE REMOVABLE BACKS TO ACCESS PLUMBING CHASE. ALL UNITS ARE AVAILABLE IN ADA HEIGHT FOR HANDICAP ACCESS.**
- A. Sides to be 18-gauge formed with 1" flanges on top, bottom and back with 2-3/16" return on 1" front flange to receive removable pilasters and front of case track.
 - B. Bottom to be 18-gauge formed with 1-3/8" flange and 3/4" return on front with 1" flange down on back and 1" flanges up for welding to sides. Bottom to also have 3/4" access holes, each to receive plastic cap plug, above leveling gusset. Bottom shall be full depth and full width of cabinet.
 - C. Front Crosspiece at top to be 16-gauge, width of opening of cabinet (to create flush surface typical of bottom & side), 1-3/8" high with 3/4" return and 1-1/4" deep with 3/4" return.

- D. All four pieces above, when spot-welded together, will be gas-welded at each front corner and ground smooth to create smooth integral corners for painting.
- E. Backs to be 18-gauge with no formation at sides, which are spot-welded to side flanges, and 3/4" flange at bottom and top to have 1-1/4" bend with 3/8" return to create rear crosspiece. Backs to have cutouts for access to plumbing connections (one cutout on single width cabinets and two cutouts on double width units to accept removable panels). Sink back to be only 13-3/8" high up from bottom of base, with no cutout, and sink unit shipped with removable rear top rail.
- F. Rear pilasters to be 18-gauge, spot-welded into each corner. Each pilaster to be 7/16" high x 25/16" wide x full height of cabinet opening. Each pilaster to have 1/8" x 5/16" slots on 1/2" centers (typical slottage of front removable pilaster) for adjustable shelves along with provision to accept rear of tracks. Double-wide unit to have center pilaster (between both cutouts) 7/16" high x 3-3/4" wide height of opening with provisions as above on right and left side of pilaster.
- G. Double units to have center upright 1" wide with two 2-3/16" flanges x height of opening to be welded into place except for open units and units with double-wide drawers. Upright to have typical provisions found on side return. (This piece also to be gas-welded in place at top and bottom, and ground to create seamless joint, typical of corners.)
- H. Integral base located to create 4" high x 3" deep toespace. Base constructed of 18-gauge with two halves, each being full width of base unit with both sides 9-3/4" long. Height of base is 4" with 5/8" returns on top and bottom. Both halves are spot-welded together at each side with 3-5/8"L x 2-13/16"H high splices. (All 4 pieces to be 18-gauge material). Two 14-gauge leveling channels at each side of base with 2 cage nuts in each. Cage nut to receive a 3/8 16 leveler with 1/4" hex head for easy leveling through bottom for approximately 1" of leveling capability.
- I. Adjustable shelves to be of 18-gauge cold rolled steel and formed with 3/4" flanges on all sides with front and back of shelf to have 3/8" return. Shelf size is 19 9/16" front to back. Shelves over 36" in width to have 18-gauge reinforcing channel spot welded to underside of shelf.
- J. Removable rear panels to be 18-gauge in all base cabinets, except sink unit and model 7000 acid storage units. Panel to be full width and height of cutout in back (two required for double units). Panel to be formed of 18-gauge with sides to be 3/8" flanges down, top and bottom to be 1/2" offsets with bottom flange to be 3/8" and top to be 1-1/8" to allow for movement upwards to remove panel. Panel supplied with 3/4" finger hole on center 2" up from bottom and to be equipped with cup plug.
- K. Drawer to be constructed with four pieces: 20-gauge drawer body, drawer back, inside front, and drawer front. All of which are to be spot-welded into one integral piece, with drawer front to be fastened on using sheet metal screws for easy removal when installing locks. Drawer face to be pre-punched knock out to accept lock.

- a. Traditional front overall is 7-1/8" high (full) or 3-1/2" high (half). Formed with 7/8" flanges and 1/2" returns with side returns to have provisions to accept inside front and two 7/64" holes to align with mounting angles (which are spot-welded on drawer body) and accept sheet metal screws, also to have prepunched holes on 4" centers to accept wire pull (two pulls required on double-width fronts). Adhesive mounted honey comb sound deadening material to be placed into drawer front.
 - b. Traditional inside front in height is 3/4" less than outside front and typical width of inside drawer body. Bottom and both sides to be formed with 27/32" flanges with top to be formed with 1/16" offset, 1/2" high and 17/32" flange. Outside front to be 20-gauge and inside front to be 20-gauge.
 - c. Body to be formed out of 20-gauge cold rolled steel with sides form up 2-9/16" on half drawers and up 6" on full drawers with 3/8" flange and 5/16" return at top of both sides. Sides to be formed up with 90 degree bend and will accept inside front and back.
 - d. Back to be formed of 20-gauge cold rolled steel with height 2-1/16" on half drawers and 511/16" on full height drawers with width being inside dimension of body. Formation to be with 1/2" flanges on all four (4) sides for welding to drawer body with 1/2" return on top of back only.
 - e. Both inside front and back are spot-welded into drawer body with flanges of inside front and flanges of back welded flush to raw edges of front and rear of body.
- L. Hinged doors to be double pan construction with both inside and outside door formed of 18gauge cold rolled steel. All four sides formed typical with 13/16" flange and 1/4" return. Two 1/4" diameter holes on center 4" apart and 1-1/2" in from edge of door to receive wire pull: two hinge provisions each typical as follows: 2-9/16" high cutout located from top and/or bottom of door 2-3/16" to center of cutout. Cutout starts 7/32" on front of hinge side and wraps around door to end up 5/32" from same side on rear of door. Typical 3/4" flange on all sides. Hinge brackets (2 per door) are formed of 14-gauge material 5/8" wide x 4-7/8" long with two 1/8" offsets to create 2-9/16" long provision for hinge, which includes 3 holes drilled and tapped for 8/32 machine screws. Outside door and inside door are welded to create one integral rigid piece with sound deadening.
- M. Sliding doors are similar, less provisions for hinges, wire pull and roller catch. In place of these provisions are provisions for door rollers and finger cup.

2. CORNER BASE UNITS

- A. Unit manufactured with front access to be 18" wide, with two front sides at 22-1/2" deep, two rear sides a 17 1/8" deep and back to be 25 5/8" wide.
 - a. Front to be full height cupboard door for storage or with partial door and louver panel for sink cabinet.
 - b. Two front sides and rear sides to be formed out of one piece on each side with both portions to be solid formation.
 - c. Back to be formed typical of base units with one removable back for plumbing and electrical access.
- B. Optional lazy Susan to consist of vertical post with top & bottom mounting provisions for post to be secured into cabinet (independent of countertop) with two full round shelves. Shelves to be adjusting vertically with additional shelves available as option.

3. TABLE APRON & KNEESPACE DRAWERS

- A. Table aprons to be 16-gauge cold rolled steel, 3-3/4" high, 22-1/2" deep (with 28-1/2" depth optional), and width as required or specified by customer. Apron has 1-1/4" top flange and 1" bottom flange and formed in two halves with length being width as specified with two bends 11 1/4" (22-1/2" apron) or 14-1/4" (28 1/2" apron). Unit to be spot-welded together with splices at each side and center support front-to-back when necessary (occasionally, large aprons manufactured in four pieces in-lieu of halves). Leg pockets to be 14-gauge cold rolled steel, spotwelded into each corner, Legs are bolted in place with 1/4" - 20 bolts.
- B. Standard legs are to be H-leg design, manufactured with 16-gauge 2" x 2" tubing and 16-gauge spreader to weld both legs together with each leg to have 3/8" - 16 levelers, adjustable to 1" in height. H-legs available in both cabinet heights and both apron depths (4 variations).
- C. Kneespace drawers are standard half height drawers in both 18" wide and 24" wide sizes. Drawer housing to be manufactured of 18-gauge cold rolled steel with two sides 3-3/4" high x 22-1/2" deep with 1" flanges on top, bottom & back with front to have 1" flange with 2-3/16" return for drawer roller. Back to be 18-gauge with formation on top to be spot-welded inside of unit between rear of sides. Unit to have top weld strap with 1/2" flange at front, the width of drawer unit. 36" x 48" units to be two single units welded together with front bottom stiffener and rear 16-gauge stiffener, both to be 36" or 48" wide to create integral double drawer unit. Drawer ends available to extend the width of drawer unit. (example: 24" unit with 6" end would create a 30" wide unit). End would be typical of an apron half in formation and gas-welded in place in front and back of drawer unit. Drawer ends also available on both ends of drawer unit. (Example: 7200-30 is a 24" unit with two 3" ends). When using H-legs on a drawer end, the smallest end possible is 4" to accommodate leg pockets.

4. KNEESPACE PANELS, FILLERS, SOFFITS, & VERTICAL SERVICE CHASE

- A. All panels and fillers to be fabricated out of 20-gauge cold rolled steel. All spring clips used for mounting against cabinets and/or wall are 18-gauge galvanic material.. Mounting flanges on all panels and fillers are 1-1/2" long typical.
- B. Adjustable kneespace panels to accommodate the width of the opening and/or kneespace drawer with mounting flanges and 3/4" x 1/2" box bends at top and bottom. Panels are fabricated of 20gauge material in four heights: 35 1/2" for 7000 & 7100 series, 31 7/8" with kneespace drawer/apron frame; 28 1/4" for 7300 & 7400 lowboy series, 24 5/8" with kneespace drawer/apron frame.
- C. Front base fillers are fabricated of 20-gauge material in two heights: 35 3/4" for 7000 & 7100 series and 28 1/2" for 7300 & 7400 lowboy series. Each standard with 3" x 4" high toe space at bottom, 3/4" returns at top and bottom, and mounting flanges.
- D. Rear base fillers are fabricated in the same two heights with side-mounting flanges by width of void to be closed. Standard width rear base filler for 30" top to be 6 1/2".
- E. Standard bottom corner toe space fillers are 4" x 4" high.
- F. Miscellaneous fillers available upon request or as needed (size & configuration).
- G. Sloping tops to be 20-gauge cold rolled steel with 30 degree slope. Tops for 13" deep will have an overall height of 7 1/2"; tops for 18" deep will have an overall height of 10 3/8". Tops are cut to width of cabinet and include end caps.
- H. Vertical Service Chase to be 18-gauge cold rolled steel formed in an enclosed structure. Interior flanges at top and bottom for internal mounting to surfaces. Individual sections of service chase produced to a maximum of 8' high, multiple sections internally joined at flanges to reach required height. Removable access panels on one side which will be mounted flush to the body of the service chase with flathead sheet metal screws, removable without the use of special tools. Stiffener channels applied within the service chase to provide reinforcement and stability to the structure. The service drop shall be painted on all surfaces to match cabinets. Optional fixture cutouts able to be provided as needed.

5. WALL UNITS MUST BE AVAILABLE IN THE SAME WIDTHS AS THE BASE UNITS & 24", 30, 36", & 48" HEIGHTS. 13" & 16" DEPTHS STANDARD. ALL UNITS TO BE DESIGNED TO BE RECONFIGURED IN THE FIELD TO ADD DOORS OR REMOVE AS NEEDED WITH THE USE OF HAND TOOLS ONLY.

- A. Wall units are available in four different heights: 24", 30", 36", and 48". Single widths available in 18", 21", and 24"; double widths available 29", 35", 41" and 47". All units have standard depth at 13" with optional 16" depth available.
 - B. Tops to be 18-gauge cold rolled steel with overall size to be 13" deep. Tops to have 3/4" flanges on both sides and rear with 1-3/8" flange on front with a 1" return.
 - C. Sides to be 18-gauge cold rolled steel. Sides will be formed with a 3/4" flange at rear, a 1" flange on bottom and front, with 1" flange and 2-3/16" return to have provisions for hardware.. Sides will have a 3/8" coved bottom and 7/8" spotting flanges. Back will be 3/32" less than the overall width and height of the unit with 7/16" flanges for spot-welding on all four sides. Back will be provided with slottage for adjustable shelf clips on 1/2" centers. Outside bottom will be 1" smaller than the depth of the unit and 1-1/2" smaller than the width. Outside bottom will have 15/16" flanges on both sides and 3/4" pointed up in front, which will be gas-welded in place. Typical 18-gauge construction.
 - a. Shelves, doors, and hardware provisions typical of base units
 - D. Glass doors to be double-panel, reinforced frame construction as hinged doors. Glass is 1/4" thick, set and held in place in a resilient glazing channel. Sliding doors will operate on nylon rollers suspended from the extruded aluminum track at the top of the door, with a center guide at the bottom. Sliding doors will have recessed aluminum door pulls and glass stop on inside. Rubber channels used to cushion glass in glazed doors shall be a neoprene rubber extrusion.
- 6. FREESTANDING UNITS MUST BE AVAILABLE IN 18", 21", 24", 29", 35", 41", & 47"WIDTHS AND 18" OR 24" DEPTHS. ALL UNITS MUST BE DESIGNED TO BE FIELD RECONFIGURED TO ADD OR DELETE DOORS WITH USE OF HAND TOOLS ONLY.**
- A. Freestanding units are 84-1/4" high overall, including flush base. Single widths available in 18" and 24"; double widths available 29", 35", 41" and 47". Depths available are 18" and 24". All specifications typical of wall units except the following:
 - a. Sides to be 18-gauge, formed only front to back (no formation on top of bottom). Depth is typical of overall unit with 1" front flange and 2-3/16" return.
 - b. Back to be 18-gauge and has formation only on sides, which are 1/2" flanges for spotwelding.
 - c. Two side angles of 14-gauge cold rolled steel 11/16" x 11/16" x 7/8" smaller than depth of unit are required; one is spot-welded to the inside bottom of each side

- d. 14-gauge angle 1" x 11/32" x 1/4" less than width of unit to be spot-welded onto bottom of back for rigidity.
- e. 14 gauge angle 7/8" x 7/8" x 1/4" less than width of units to be spot welded onto top of back for rigidity

7. FINISHES - METAL CABINETS- ALL UNITS MUST BE AVAILABLE IN 16 STANDARD COLORS FOR QUICK SHIP PROGRAM AND BE AVAILABLE TO COLOR MATCH CUSTOMER SELECTION AT NO EXTRA CHARGE. 2 TONING OF CABINET SHELL AND COMPONENTS AVAILABLE AT NO CHARGE.

A. Phosphatizing Process

- a. The welded, assembled cabinets shall have all exposed spot- or otherwise- welded surfaces ground to a smooth surface suitable for finishing. The units shall be given a pre-paint treatment to ensure excellent paint adhesion and to aid in the prevention of corrosion.
- b. Complete cleaning of the metal shall be accomplished by the use of an alkaline cleaner to remove oil, grease and soil. The units shall be rinsed, followed by the application of a phosphate coating to transform the metal surface into a new, non-metallic and conductive surface. The phosphate treated parts shall be rinsed in cold water.
- c. The units shall have all unreacted chemical removed in a chromic acid seal treatment. The completely treated units shall be placed in dry-off oven at high temperature for five (5) minutes to dry the work and stabilize the complete phosphate treatment.

B. Painting Process

- a. Following the phosphate treatment, a full powder coating of specially formulated acrylic finish shall be applied and baked on at high temperature for fifteen (15) minutes, then cooled to produce optimum coating properties. (Film thickness of finish coat to be 1.25 to 1.75 mils).

C. Colors

- a. 20 Standard colors available plus color matching.

D. Chemical Performance Test

1. Performance Test Method

- a. Chemical performance tests shall be made by applying ten (10) drops (approximately 1/2 cc) of each reagent to the surface to be tested. The reagent is covered by a watch to be tested. The reagent is covered by a watch glass, concave side down, in the center of the puddle to hold the reagent in place. tests for volatile solvents shall be done in such a way that a wet surface shall be maintained for the duration of the test period. A 1" ball of cotton, saturated with solvent, shall be placed on the rest surface. This shall be covered with a small jar to retard evaporation of the solvent. Reagents are allowed to remain on the surface for one (1) hour.
- b. At the end of the test, reagents are removed and the surface is washed down with soap and water and dried before examination and evaluation.

E. Performance Test Ratings

Where the terms "excellent" and "good" are used in the performance test results, the following definitions shall apply:

Excellent - The test leaves no visible effect on finish other than a slight change of gloss visible only from a grazing angle.

Good - The test leaves no effect other than slight discoloration, change of gloss or temporary slight softening of film with no loss of film protection.

Results of chemical spot performance tests after one (1) hour:

NOTE: Concentration of reagents is percent by weight. All chemicals shall be "reagent grade", in accordance with the requirements of the American Chemical Society.

ACIDS

- Hydrochloric, 37%
- Phosphoric, 75%
- Sulfuric, 25%
- Nitric, 25%
- Glacial Acetic
- Formic, 88%

BASES AND SALTS

- Sodium Hydroxide, 10%
- Sodium Hydroxide, 25%

- Ammonium Hydroxide, 23%
- Hydrogen Peroxide, 5%

SOLVENTS

- Ethyl Alcohol
- Ethyl Acetate
- Ethyl Ether
- Xylene
- Acetone
- Methyl Ethyl Ketone
- Formaldehyde, 37%
- Carbon Tetrachloride

F. Moisture Resistance Test

- a. Boiling water shall be trickled over the test panel surface inclined at 45 degree angle for five (5) minutes. At the end of the test, the surface shall be dried and, upon examination, shall show no visible effect on the finish.
- b. A cellulose sponge (2 x 3 x 1") shall be soaked with water and place on the test surface for a period of 100 hours. (The sponge must be maintained in a wet condition throughout the test period). At the end of the test, the surface shall be dried and upon examination, shall show no visible effect on the finish.

G. Bending Test

- a. An 18-gauge metal strip, finished as required under section 2.155, when bent 180 degrees over a 3/4" diameter mandrel, shall show no peeling of the finish or expose of the base metal.

H. Adhesion Test

- a. Performance Requirement
 1. Ninety (90) or more squares of the test sample shall remain coated after the scratch adhesion test.
- b. Test Procedure
 1. Two (2) sets of eleven (11) parallel lines, 1/16" apart shall be cut with a razor blade to intersect at right angles, thus forming a grid of 100 squares. The cuts

shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush and examined under 100 foot candles of illumination.

c. Test Evaluation

1. Ninety (90) of the squares shall show finish.

I. Hardness Test

a. Performance Requirement

1. The test sample shall have a hardness of 3-H using the pencil hardness test.

b. Test Procedure

1. Pencils, regardless of their brand, are valued in this way: 8-H is the hardest, and next, in order of diminishing hardness, are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest).
2. The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The pencil used before that one, that is, the hardest pencil that will not rupture the film, is then used to express or designate the hardness.

c. Test Evaluation

1. The paint film shall have a hardness of 3-H minimum.

8. HARDWARE

- A. Base unit drawer and door pulls to be of clean modern brushed aluminum design pull handle w/radiused edges offering a comfortable hand grip and attached to door or drawer with machine screws. Cast pulls shall have adequate cross section to ensure against breakage under rough usage and a chrome finish. Flush pull handles available at no extra charge.
- B. Base unit hinges to be of stainless steel & shall be institutional type with a five-knuckle, bullettype barrel. Hinges shall be attached to both door and case with three (3) heavy steel screws through each leaf. Welding to doors or case is not acceptable. Doors under 36" in height shall be hung on two (2) 2-1/2" hinges; doors over 36" in height shall be hung on three (3) 2-1/2" hinges.

- C. Base unit door catches to be nylon roller catch type. Use of an active knob and up-and-down bolt assembly will be acceptable only on such special units as solvent storage cabinets or metal floor cases; doors on such units will be locking type.
- D. Base unit and wall case shelf clips for adjustable shelves shall be nickel-plated steel. A channel shall be provided to support the half-depth shelves.
- E. Sink supports shall be of the hanger type, suspended from the top side horizontal 1-1/2" Unistrut rails of the cabinets by four (4) 1/4" rods, threaded at the bottom and offset 1/4" at top to hang from full-length support angles at side rails.

9. TRIM

- A. Leg shoes to be provided on table legs to conceal shims or leveling devices. Shoes shall be covered at bottom, shall be 2-1/2" high and shall be black chemical rubber. Use of a leg shoe that does not conceal leveling device will not be acceptable.
- B. Base molding to be black vinyl, sufficiently pliable to permit cementing tightly against cabinet base and floor line to provide a watertight seal. Molding shall be covered at bottom, shall be 4" high and shall be applied continuously around base of cabinets and cases after installation and leveling to cover any shims and to effect floor seal. Waterproof cement shall be used as an adhesive.

10. MECHANICAL SERVICE FIXTURES

Valve bodies are cast of commercial red brass alloy which conforms to A.S.T.M. standard C85700 or C84400. Flanges, turrets and handles are of forged brass alloy which conforms to A.S.T.M. standard B124-74-280. Assembly components are of red brass alloy or stainless steel alloy. Seals and seat discs are of materials which are suitable for potable water. All fixtures shall be furnished with a chromium-plated finish, highly polished on all exposed surfaces and chrome plated to specifications which conform to A.S.T.M. standard B456-5 and exceed ANSI A112.18.1. Corrosion-resistant finishes may be furnished when specified.

A. Laboratory Water Fixtures

- 1. All water faucets shall have an operating cartridge that contains all working parts that are subject to wear, and shall close with the pressure of the water to ease shut off and to provide a tight seal. All moving parts which are in the waterway shall be of stainless steel or monel with the exception of seal, which shall be of Ethylene propylene diene monomer. The handle broach shall be a four point tapered broach to allow ease of handle removal. All repair parts shall interchange regardless of fitting type. Faucet shall be capable of converting to manual

or self-closing without requiring removal of the body or any special tools. All faucets shall withstand a test of 100 lbs. per square inch.

2. All gooseneck spouts must be attached to faucet body by means of a union connection to allow changing of spouts after installation. Spouts which are threaded directly into faucet body will not be permitted. All gooseneck spouts must be easily converted from rigid to swing or swing or rigid after installation, with no special adapters required. Sealing shall be achieved by double O-ring or E.P.D.M. seal. Vacuum breaker spouts shall be of atmospheric type which conforms to A.S.S.E. standard 1001. Gooseneck spouts shall have a ten-serration hose connector unless otherwise specified.
3. All faucets and needle-type valves shall have fore-arm, forged brass handles with plastic screw-type indicator discs signifying -- by color and letters -- the service controlled and shall have threads integral with discs. The disc shall not be held in place with a separate metal retainer. Fixtures having quick-acting valves shall have lever handles with service indicated by a button in the handle.
4. Steam cocks shall have black molded plastic composition handles and be constructed so they can be easily repacked under pressure and easily converted to needle-type cocks by changing valve steam and seat. Steam cocks shall be indexed accordingly.
5. Distilled water fixtures shall be of red brass alloy with a polished chrome-plated finish over nickel and copper with tin-lined interior, or PVC type as specified. All distilled water fixtures shall be self-closing type.
6. Vacuum Breakers shall be chrome-plated brass and shall be either "Water-Saver" or "Chicago" types, as required by the area plumbing code. Vacuum breakers shall be installed between the control valve and the outlet of the fixture. When the area plumbing code requires vacuum breakers to be installed in an elevated position, the piping necessary to connect valve, vacuum breaker and hose end shall be supplied by the plumbing contractor.

B. Gas, Air, and Vacuum Cocks

1. All ground key service cocks shall have stem and body ground and lapped and shall have stem held in place by spring and locknut that has been staked to prevent removal. Each fixture shall be leak proof at 40 lbs. maximum pressure per square inch (PSI) when tested under water.
2. All floating needle point valves shall have working parts contained within a removable cartridge. Needle point shall be stainless steel precision finished and shall be held in place on stem assembly with a U-clip which is of stainless steel. Needle point shall seat against a brass seat contained within a replaceable sleeve. Micro control type valves shall have same

features as needle point and shall have a tapered needle point and shall have a length no less than .750 inches and shall seat into an orifice no less than 1/8" diameter. Valve shall have a minimum of 5-1/2 full turns of the handle from off position to full on position. Each fixture shall be leak proof at 125 lbs. maximum PSI when tested under water.

C. Remote Control Valves

1. Remote control valves shall consist of 3/8" compression disc valves for water and steam fixtures and 3/8" slow compression true needle valve for gas, air and vacuum fixtures, complete with extension rods having handles with colored button indexes for each service as specified for each fixture.
2. Extension rods shall operate valves through an escutcheon-plate bearing mounted on the exterior of the scientific laboratory furniture equipment. Portions of remote control fixtures exposed within fume hood chamber shall be furnished with a chemical-resistant finish.

D. Mounting Shanks

1. Mounting shanks shall be furnished with required to anchor fittings to service shelves, ledges and decks for all fixtures except electrical. They shall provide a running pipe thread running into a tapered thread to provide leak-proof joints and a locknut to provide a means of anchoring fixture to the ledge.

E. Serrated Hose Ends

1. Serrated hose ends shall be provided on all water and steam fixtures. Serrations shall be so designed to hold hoses securely. An aerator, when so specified, shall be furnished in place of the serrated hose ends for water fixtures.

F. Color Index Buttons

1. Handles of fixtures shall have screw-on type, color-coded index disc to designate type of service on all mechanical service fixtures. Both color and lettering shall be provided in button (screw-on type) which shall be located in handles of fixtures. Buttons shall not be held in place with a metal retainer. All indexes shall be of colored plastic material, and indented letters shall be filled with enamel in contrasting colors. Color designations shall be as follows:

		BUTTON	LETTER
<u>SERVICE</u>	<u>INDEXING</u>	<u>COLORS</u>	<u>COLORS</u>
Cold Water	CW	Dark Green	White

Hot Water	HW	Red	White
Gas	GAS	Dark Blue	White
Air	AIR	Orange	Black
Vacuum	VAC	Yellow	Black
Distilled Water	DW	White	Black
Steam	STM	Black	White
Oxygen	OXY	Light Green	White
Nitrogen	N	Gray	Black
Hydrogen	H	Pink	Black

11. ELECTRICAL FIXTURES

- A. Deck mounted electrical fixtures shall be 20-Amp, 110-volt, 3-wire polarized grounded receptacles. Reagent rack mounted and flush mounted receptacles shall be 15-Amp, 125-volt.
- B. The electrical pedestal-type fixtures and electrical flush boxes are to be corrosion-resistant aluminum alloy, polished to a chrome-like finish.
- C. All receptacles shall be designated to permit only plugs having the same current characteristics as the service line to be inserted.
- D. All fixtures and any electrical conduit or fittings to be furnished under these specifications shall be accordance with requirements of the National Electrical Code and the National Fire Prevention Association.

12. STEEL CASEWORK CONSTRUCTION PERFORMANCE

- A. Base cabinets shall be constructed to support at least a uniformly distributed load 200 lbs. Per square foot of cabinet top area, including working surface without objectionable distortion of interference with door and drawer operation.
- B. Base cabinet corner gussets with leveling bolts shall support 500 lbs. Per corner, at 1-1/2" projection of the leveling bolt below the gusset.
- C. Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 40 lbs. per square foot up to a maximum of 200 lbs., with nominal temporary deflection, but, without permanent set.
- D. Drawer construction and performance shall allow 15" clear when in an extended position and suspension system shall prevent friction contact with any other drawer or door during opening or closing. All drawers shall operate smoothly, a minimum of 10,000 cycles with an evenly distributed load of 150 lbs.

E. Swinging doors on floor mounted casework shall support 200 lbs. suspended at a point 12" from hinged side, with door swung through an arc of 160 degrees. Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.

13. COUNTERTOPS

A. Epoxy resin countertop tops shall be cast of modified thermosetting epoxy resin, 3/4", 1" or 1 1/4" thick. Tops shall be a uniform mixture throughout and not depend on a surface coating which is easily removed by physical or chemical abuse. Marine edge to be provided when specified. Backsplash and end splash to be loose 4" high x 1" thick and coved to top during installation. Epoxy tops will be furnished in standard Black Onyx with the option of Platinum Gray at additional charge.

Epoxy resin tops are blended to provide maximum chemical resistance and physical strength. Finished material shall conform to the following physical properties testing:

Compressive strength	(ASTM D-695)	34,200 lbs./sq. in.
Tensile Strength (avg)	(ASTM D-638)	10,100 PSI
Flexural Strength	(ASTM D-790)	16,200 lbs./sq. in.
Rockwell "M" Hardness	(ASTM D-785)	111
Density	(ASTM D-792)	2.03g./cc
Water Absorption	(ASTM D-570)	0.004%
Fire Resistance	(ASTM D-635)	ATB (sec)=0 Samples did not ignite

B. Stainless-steel countertops shall be Type 304 No. 4 satin finish. Tops shall be of 18-gauge stainless steel reinforced on the underside by 16-gauge carbon steel channels, so spaced as to prevent twisting, oil-canning or buckling. Exposed edges of top shall be formed into a channel shape 1-1/4" high. Tops may be fabricated with a marine edge when specified. Backsplashes and curbs shall be integral and formed from the same sheet as the top. Sink tops shall be pitched to sink bowl for proper drainage. All sink basins shall have bottoms sloped towards drain openings. Entire underside of tops shall be sprayed with sound-deadening material.

C. Laminated plastic tops shall be 1/32" thick laboratory grade high pressure laminate which shall not crack or splinter and shall be heat resistant. The laminated plastic shall be attached with a water-resistant adhesive to a moisture-resistant particle board core or optional treated plywood, providing a finished overall top thickness of 1-1/4". Tops shall have a self-edged front edge. Tops with curbs shall have attached 4" high x 3/4" thick curb with a 90-degree angle at the junction between top and curb. Underside of top is to be sealed with a protective coating. Post formed plastic laminate countertops are also available.

D. Characteristics (Countertops)**a. Tolerances:**

1. Size: Length, plus 0, minus 1/6"; width and thickness, plus or minus 1/32".
2. Squareness: Plus or minus 1/64" for each 12". (A tabletop spanning 48" will be held to plus or minus 1/16").
3. Fabrication: Location of cutouts and drillings -- plus or minus 1/16" sizes of cutouts and drillings - plus 1/16" minus 0.
4. Flatness (Warpage): Plus or minus 1/16" for each 48" span.

14. SERVICE SHELVES, LEDGES AND DECKS

- A. The ledges and shelves shall be easily altered on the job site to accommodate existing wall conditions and shall be easily drilled to accommodate service lines. Service ledges and shelves shall provide a raceway behind the base units to house the mechanical service piping. Ledges are available in any of the materials listed above.
- B. Service shelves shall be supported by angular brackets, capable of being mounted on strut supports or directly off wall providing for fine shelf adjustment.
- C. Service ledges shall be supported by a 90 degree wall angle at the rear, and the countertop backsplash at the front.
- D. Service shelf and service ledge fillers, where shown or called for to enclose open spaces at the end of wall and island assemblies, shall be finished in the same material as the service shelving. They shall be provided complete with means for attaching to the service shelving and shall cover the piping from the top of the service shelf to the base cabinets.

15. SINKS, DRAIN TROUGHS AND CUP SINKS

- A. Epoxy resin sinks shall be completely cured during processing. Sinks shall be one piece, nonglaring, black in color (gray or beige optional) with generous covering in all corners and bottom, and a minimum of 1 degree dishing to outlet. Sinks shall possess high resistance to mechanical and thermal shock. Sinks shall be field-bonded to the underside of the countertop or top mounted into rabbeted cutout to become an integral part of the epoxy resin top.
- B. Stainless steel sinks shall utilize Type 304 stainless steel and all exposed surfaces shall be finished in a No. 4 satin finish. Sinks shall be of 18-gauge metal unless heavier gauges are

specified or dictated by construction requirements. All sink joints shall be butt-welded by the heliarc-welding process. Inside radii shall be 1-1/8". bottom shall be pitched to the sink outlet. Where stainless steel countertops occur, sinks shall be welded to form an integral part of the top. No soldering will be permitted in connection with the construction of sink bowls.

- C. Drain troughs shall be constructed of epoxy resin. The troughs shall be cast units with no longitudinal joints, with a generous radius provided in the bottom corners for easy cleaning. A slope of 1/8" or more per foot shall assure complete drainage.
- D. Cup sinks shall be epoxy resin, stainless steel, or Kimax* brand glass as specified.

16. SINK ACCESSORIES

- A. Traps and drain fittings shall be polypropylene or Kimax* brand tempered glass. They shall be included as part of the sink assembly only when material is specifically called for and shall be 1 1/2" or 2" in diameter as indicated.
- B. Traps shall be a standard "P" type and shall have a beaded end for connection to the main drain line by use of a coupling or be provided with standard IPS thread.
- C. Kimax* brand or polypropylene traps shall be furnished for all sink assemblies when specified.
- D. Sink strainer and tailpieces shall be furnished as a standard part of each sink assembly. Sink strainer shall be crisscross-type with 1 1/2" diameter outlet.
- E. Standing beehive or open-end type overflows shall be provided when specified.

17. CANOPY HOODS

- A. The canopy hood efficiently collects exhaust heat, steam and odors when mounted over work areas where steam baths, hot plates, and other heat-producing equipment is employed.
- B. The superstructure is finished with a chemical resistant painted sheet steel. The standard canopy hood is 30" deep and 18" high with duct collar of 8", 10", 12", 16" or 20" diameter. Threaded hanging rods can be provided with couplers for additional ceiling height when specified. Stainless steel construction, duct transitions and baffles are optional and provided only when specified.

18. FUME HOODS

- A. General: Hood superstructure shall provide for efficient removal of all fumes, both heavy and light, with the least amount of turbulence of air entering the hood.

- B. Materials: The exterior of the superstructure shall be fabricated of cold rolled furniture steel finished in color selected. Lead coated steel is not acceptable. Exterior finish shall be chemical resistant 2-part epoxy finish. The interior shall be non-asbestos, primaline, stainless steel, Wesliner 1125 or approved equal.
- C. Body Construction: Fume hood superstructure shall be double wall construction consisting of an outer shell of sheet steel and an inner liner of corrosion resistant material as specified. The double wall shall house and conceal steel framing members, attaching brackets and the remote operating service fixture mechanisms. The frame, outer shell, and inner lining shall be assembled, fastened and connected into a rigid, self supporting entity.
- D. Wall thickness shall be 5-7/8" maximum, providing maximum interior work area. The interior end panels shall be furnished with a removable panel to provide access to the service piping and valves to facilitate installation and maintenance.
- E. Framework: The inner lining and exterior finished panels are attached to a framework constructed of 16-and 18-gauge steel. This framework is welded and bolted together to form a rigid assembly and is painted with a black rust-inhibitive finish. All steel parts are treated with an iron phosphate
- F. Sash: Fume hood sash shall be full view type providing a clear and unobstructed side-to-side view of fume hood interior and service fixture connections. Vertical sliding sash constructed of 18-gauge steel, welded into a rigid frame, and has removable stainless steel glass retainers for reglazing...sash has full length finger lift and is supplied with nylon glides on each side. Sash guides are stainless steel. The sash is glazed with 7/32" clear laminated safety glass set in a "U" shaped neoprene channel. The sash is counter-balanced using a singled weight at the rear of the hood, and is attached to the sash with 1/16"...7 x 7 plastic coated aircraft type cable...total diameters of .105". Cables ride on six 2" diameter nylon ball bearing pulleys. Sash weight shall be located in the center back of the hood and made of 1/2" thick metal plate. Other materials for the weight, such as stone, shall not be acceptable. Weight shall be supplied with plastic guides for ease of operation, and shall run in roll formed steel channels. Channels shall be coated with rust-resistant finish. Weights shall be drilled and tapped and be supplied with threaded eye bolts for attachment to sash cable. Sash weights in side walls of hoods are not acceptable. Six and eight foot wide fume hoods shall have two laminated safety glass panels separated by a reinforcing mullion.
- G. Lights: A two-tube, rapid start, vapor sealed fluorescent light will be provided on each superstructure. These maximum length fixtures are relamped from the outside. Average interior illumination levels of the work area shall be 80 foot candles minimum. Work area shall be defined as that area inside the superstructure from side to side and from face of baffle to the inside face of sash and from the working surface to a height of 28 inches. Bulbs are included.

- H. Baffles: Baffles shall provide controlled air vectors into and through the fume hood, and be fabricated of the same material as the liner. Exhaust slots shall be provided with upper and lower slots adjustable. A fixed, permanently open horizontal slot located 17" above the work surface shall be provided. Fume hood shall maintain essentially constant exhaust volume at any baffle position. Changes in average face velocity and exhaust volume as a result of baffle adjustment shall not exceed 5% for any baffle position at the specified face velocity.
- I. Air Foil: Perimeter of access opening shall have an air foil or streamlined shape with all right angle corners radiused or angled. Bottom horizontal foil shall provide a nominal one inch bypass when the sash is in the closed position. Bottom foil shall be removable without the use of special tools. Bottom foil shall be stainless steel to provide proper acid and abrasion resistance. Exhaust outlet shall be rectangular.
- J. Worktop: Fume hood worktop shall be 1-1/4" epoxy resin dished 1/4" to contain spills. Service slots are provided. Stainless steel worktops will be provided only when specified.
- K. Base: Fume hood base shall be standard 2-door type unless acid/solvent or flammable storage is specified. Construction to be typical of standard Lab Design base units.
- L. Services: Services shall be provided when specified. Fixtures shall be chrome plated unless epoxy or other coating material is specified.
- M. Alarm: The AMS 335 alarm alerts the user to abnormal conditions using both visual and audible alarms. Visual 3 color quick indicator display for safety, shows airflow in feet per minute in seconds. LED's are calibrated per installation for high, normal or low flow conditions. A test button allows the operator to check audible alarm. The audible alarm also has a push to silence button.
- N. Front opening is framed with a 45 degree angle fascia that substantially reduces the turbulence of air entering the hood. The bottom horizontal air foil directs a current of air at countertop level to purge heavy fumes or spillage.
- O. Interior lining is solid welded type 316 stainless steel with No. 4 finish. The integrated worktop is dished 1/4" with a full width drain trough at the back. The trough slopes from 3" deep on the high side to 4" deep on the low side, with a 1-1/2" drain outlet. The washdown system consists of a perforated pipe behind the upper baffle with remote control in the front post.
- P. The baffles shall be removable to allow periodic inspection.

19. FABRICATION

- A. All metal furniture required under the drawings and specifications shall be furnished in strict accordance with the description and details hereinafter provided. Construction and design shall develop maximum strength and rigidity in each sectional unit.
- B. Each sectional unit shall be fabricated as an integral unit in itself to permit relocation at any subsequent time.
- C. The door- and drawer-heads must be removable for purpose of decontamination and/or cleaning.
- D. Doors and drawers shall be sound deadened and readily removable, with door hinges easily replaceable.
- E. All hinges shall be applied to case and door bodies as hereinafter specified. Welding of hinges to either door or case will not be permissible.
- F. Where unit are joined together in assemblies, they shall be fastened by bolting through side panels with 1/4-20 bolts.
- G. All components parts shall be die-formed, ensuring uniformity and interchange-ability, and shall be assembled in jigs of accurate alignment.
- H. All cabinet parts shall not only be electrically welded, but shall be notched, keyed and overlapped, forming interlocking joint construction. The electro-welding shall be comprised of spot-welding, arc-welding and heliarc welding.
- I. Any notching, piercing, bending or framing not specifically called for in the construction specifications and/or drawings will not be permitted.
- J. All construction shall ensure a smooth, cleanable interior of all units.
- K. All die-pierced slots and perforations required for mounting of case channels, hinges, or shelf brackets shall not be visible from the exterior of the assembled cabinet after installation. Screws shall not be used in the construction of the unit proper and shall only be used where backs, pans and panels are required to be removed for accessibility.
- L. Standard cabinet units shall be so constructed that they will permit quick and easy change, after installation, from drawers to doors, or vice versa, or the substitution for two (2) half-depth drawers in place of a standard-depth drawer with the purchase of the necessary parts.
- M. All sectional units to be located on the laboratory floor shall be equipped with leveling devices easily adjustable from within the units, to compensate for unevenness in the laboratory floor.

20. DESCRIPTION OF WORK

- A. Lab Design shall furnish and install all metal scientific laboratory furniture, including conventional base and wall cabinets with end panels; service shelves, ledges and decks; tops made of epoxy resin, stainless steel, natural stone, composition cement and laboratory-grade plastic laminate; sink basins, cup sinks and drain troughs, excluding final connection; overflows, strainers, tailpieces and traps; service fixtures excluding final installation and connection fume hoods, excluding work beyond exhaust collar on hood; and all miscellaneous items of equipment as listed in these specifications and on equipment lists and/or shown or scheduled on drawings.
- B. Lab Design shall provide all necessary cutouts and openings for plumbing and electrical services as well as all filler panels and scribe strips as required where equipment abuts wall and corner conditions in order to obtain a completely enclosed assembly.
- C. Fume hood assemblies shall include blowers, when system-designed to be integral with fume hood; however, installation of blowers and work beyond exhaust collar on hood shall be done by mechanical contractor. Wiring for blowers and switches shall be done by electrical contractor.

21. WORK NOT INCLUDED

- A. Contractors for plumbing, heating, ventilation and electrical work will bring all services to, and install such services in, on, through or adjacent to, the laboratory furniture and equipment as required to complete the installation. Such work shall include any special items required to meet local codes, even though not specifically called for in specifications or shown on drawings.
- B. The plumbing contractor, under Division 15, shall furnish, install and final connect all piping, fixtures and fittings, including faucets, traps, valves, vacuum breakers, sink outlets, overflows, drain lines, steam lines, air lines, gas lines, water lines, etc. He shall make final installation and connection of all fixtures and fittings provided by scientific laboratory furniture contractor. He shall also provide, install and connect all other fixtures not a part of the laboratory furniture contract.
- C. The electrical contractor, under Division 16, shall furnish, install and final connect all electrical service, conduit, wiring, fixtures, outlets, service strips and special electrical equipment and accessories for a complete operational installation.

End of Section