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**ASPHALT PAVING SURFACE TREATMENT: Asphalt Based Emulsion Seal**

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| **SECTION USAGE MATRIX** |
| C | NA | Seminary and Small Institute Standard Plan (CHURCH EDUCATION SYSTEM) - New Project |
| SM | NA | Standard MEETINGHOUSE and PHASED MEETINGHOUSE Standard Plan - New Project |
|  R | SUP | OM/RI (REPLACEMENT & IMPROVEMENT) for Existing Meetinghouse / Seminary and Institute Project |
| CM | NA | Meetinghouse and Phased Meetinghouse Standard Plan with S&I MODULE ADDITION - New Project |
| SI | NA | S&I MODULE Addition to Existing Meetinghouse Building |
| MO | NA | MISSION OFFICE MODULE Addition to Existing Meetinghouse Building |
| UM | NA | URBAN MEETINGHOUSE for Custom Meetinghouse - New or Addition Project |
| FM | NA | Small Maintenance Project specification for FACILITY MANAGER |
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| **MODIFICATION LOG** |
| DATE | SOURCE | DESCRIPTION |
| 26 Apr 24 | Mike Molyneux | Reference Standards Updated. |
| 19 Feb 19 | Gail Olsen | Reference Standards Updated. |
| 10 Jan 19 | Chris Barker | Procedural Note Updated. |
| 23 Mar 18 | Chris Barker | Acceptable Manufacturers and Products updated. Updated Reference Standard and Procedural Notes. |
| 15 Aug 17 | Chris Barker | Acceptable Manufacturers and Products updated. General Upgrade. |
| 19 Jul 16 | Chris Barker | Cleaning requirements updated in Surface Preparation in Part 3. |
| 27 Oct 15 | Chris Barker | Changed title of section. Updated Reference Standard. General Upgrade. |
| 03 Mar 15 | Chris Barker | Design Data Submittal updated. |
| 10 Jul 14 | Chris Barker | Procedural Note Updated. |
| 25 Apr 14 | Chris Barker | Acceptable Manufacturers and Products updated. |

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| PROCEDURAL NOTES |
| COORDINATIONGENERAL:1. This Specification is written for small Maintenance Projects that use Division 01 Maintenance Project Specification instead of full Division 01 Specification.
2. Refer to 'Asphalt, Site Concrete and Pervious Concrete Maintenance Guidelines’ for preservation maintenance program and recommendations for each asphalt paving surface treatment at <http://aec.churchofjesuschrist.org/aec/design_guidelines/>.
3. Refer to *'Asphalt Maintenance Checklists for Facilities Manager and Contractor’* available at <http://aec.churchofjesuschrist.org/aec/design_guidelines> for project checklists.
4. Use the '*Agreement for Asphalt Maintenance'* available on MFD Resource Library for asphalt maintenance scoping, budgeting and for contracts.
5. It is intended that an emulsion seal last for a minimum of 5 years
6. Applicators:
7. By requiring mechanical application and information about prior Projects, this specification is intended to limit bidding to top, professional applicators and products available in Project area.
8. If Project is in remote area or for some other reason contractors of level required to meet specification requirements are not available, Section should be edited to specify requirements which can be met by top applicators available in Project Area.
9. This relaxation of standard requirements should be done with prior approval of Owner’s Representative.
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| DESIGN GUIDELINES AND BACKGROUND |

SECTION 32 0113

ASPHALT PAVING SURFACE TREATMENT: Asphalt Based Emulsion Seal

1. GENERAL
	* + 1. SUMMARY
				1. Includes But Not Limited To:

Furnish and install asphalt based emulsion seal on existing asphaltic concrete paving as described in Contract Documents.

* + - * 1. Related Requirements:

Section 01 0000: ‘General Requirements’:

Section 01 3100: ‘Project Management and Coordination’ for pre-installation conference.

Section 01 4000: ‘Quality Requirements’ for administrative and procedural requirements for quality assurance and quality control.

Section 01 4301: ‘Quality Assurance – Qualifications’ establishes minimum qualification levels required.

Section 01 7800: ‘Closeout Submittals’.

Section 32 0117.01: ‘Asphalt Paving Crack Seal’ for completion of crack repair.

Section 32 0117.02: ‘Asphalt Paving Crack Fill’ for completion of crack repair.

Section 32 0118: ‘Asphalt Paving Repair – Full Depth Patch’.

**EDIT REQUIRED:** Include following paragraph if included in Project.

Section 32 1713: 'Parking Bumpers'.

Section 32 1723: 'Pavement Markings'.

* + - 1. REFERENCES
				1. Association Publications:

Asphalt Institute:

MS-4, ‘*The Asphalt Handbook’* (Seventh Edition).

MS-16, ‘*Asphalt in Pavement Preservation and Maintenance’* (Fourth Edition).

Asphalt Emulsion Manufacturers Association:

MS-19, ‘*Basic Asphalt Emulsion Manual’* (Fourth Edition).

Asphalt Sealcoat Manufacturers Association (ASMA), Sacramento, CA [www.sealcoatmfg.org](http://www.sealcoatmfg.org):

*‘Standard Specifications’* (Latest Edition).

* + - * 1. Definitions:

Asphalt Emulsion: An emulsion of asphalt cement and water that contains a small amount of an emulsifying agent. Emulsified asphalt droplets may be of either anionic (negative charge) or cationic (positive charge).

Refined Coal Tar Emulsion: Refined coal tar is produced from “crude coal tar”, a byproduct of manufacturing steel in coking ovens. Refined coal tar emulsion is an emulsion of refined coal tar and water that contains a small amount of emulsifying agent. This is combined with, mineral aggregates, sand, polymers and other additives for a seal.

Sand: Fine aggregate resulting from natural disintegration and abrasion of rock or processing of completely friable sandstone.

Sand: Fine aggregate resulting from natural disintegration and abrasion of rock or processing of completely friable sandstone.

Seal Coat: Thin surface treatment used to improve surface texture and protect asphalt surface. Main types of surface treatments are asphalt based emulsion seals, cape seals, chip seals, fog seals, micro surfacing, penetrating seals, refined coal tar emulsion seals, sand seals, sandwich seals and slurry seals.

Tack Coat: Very light application of liquid asphalt, cutback asphalt, or asphalt emulsion diluted with water applied to highly oxidized or weathered asphalt surfaces.

* + - * 1. Reference Standards:

ASTM International:

ASTM C136/C136M-19, ‘Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates’.

ASTM D217-21, ‘Standard Test Methods for Cone Penetration of Lubricating Grease’.

ASTM D244-23, ‘Standard Test Methods and Practices for Emulsified Asphalts’.

ASTM D562-10(2018), ‘Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer’.

ASTM D977-20, 'Standard Specification for Emulsified Asphalt'.

ASTM D2042-22, ‘Standard Test Method for Solubility of Asphalt Materials in Trichloroethylene’.

ASTM D2397/D2397M-20, 'Standard Specification for Cationic Emulsified Asphalt'.

ASTM D3910-21, ‘Standard Practices for Design, Testing, and Construction of Slurry Seal’.

ASTM D4552/D4552M-20, ‘Standard Practice for Classifying Hot-Mix Recycling Agents'.

American Association of State and Highway Transportation Officials:

AASHTO T 59-15, ‘Standard Method of Test for Emulsified Asphalts’.

Federal Specifications and Standards:

Federal Specification TT-C-555B, ‘Coating, Textured (For Interior and Exterior Masonry Surfaces’, Section 3.3.3: Resistance to Wind-Driven Rain (1973).

* + - 1. ADMINISTRATIVE REQUIREMENTS

**INFORMATION:** This conference is mandatory. Do not delete or cancel. See Section 01 3100 PROJECT MANAGEMENT AND COORDINATION.

* + - * 1. Pre-Installation Conferences:

Participate in pre-installation conference as specified in Section 01 3100:

**EDIT REQUIRED:** Include following paragraph if other related sections are used in Project. Include only section(s) used for Project. Delete sections not used.

Schedule asphalt based emulsion seal pre-installation conference to be held jointly with any other 'Asphalt Surface Treatment' sections involving asphalt maintenance.

In addition to agenda items specified in Section 01 3100, review following:

Review crack repair schedule and verify that other repairs will be completed before application of asphalt based emulsion seal.

Review asphalt based emulsion seal schedule.

Review asphalt based emulsion seal mix design.

Review asphalt based emulsion seal preparation requirements.

Review asphalt based emulsion seal application rate requirements.

Review use of tack coat on existing surfaces.

Review safety issues.

* + - * 1. Scheduling:

Provide to Owner’s Representative at least seven (7) days before asphalt based emulsion seal placement commences, approved Laboratory Report and Manufacturer’s Certificate of compliance with these specifications covering specific materials to be used on this project.

* + - 1. SUBMITTALS
				1. Action Submittals:

Product Data:

Asphalt Based Emulsion Seal:

Asphalt Manufacturer’s product literature.

* + - * 1. Informational Submittals:

Certificates:

Manufacturer’s Certificate of compliance with these specifications covering specific materials used on this project.

Design Data Submittals:

Asphalt Based Emulsion Seal:

Application Rate (based on two (2) separate asphalt based emulsion seal coats of undiluted material):

Smooth dense surface: 20 gallons (76 liters) total per 1,000 sq ft (93 sq m).

Medium surface: 30 gallons (113 liters) total per 1,000 sq ft (93 sq m).

Rough, aged surface: 40 gallons (152 liters) total per 1,000 sq ft (93 sq m).

Excessively rough, aged surface: 50 gallons (189 liters) total per 1,000 sq ft (93 sq m).

Apply, unless arranged otherwise with the Owner’s Representative, 30 gallons undiluted (113 liters) emulsion seal per 1,000 sq ft (93 sq m).

Test And Evaluation Reports:

Laboratory Report of tests showing compliance with these specifications of specific materials used on this project.

Manufacturers’ Instructions:

Asphalt Based Emulsion Seal:

Mix design is to be submitted with substrate preparation and sealant application instructions.

Source Quality Control Submittals:

Provide recommended aggregate meeting Part 2 ‘Materials’ requirements of this specification.

Provide quantities of each material delivered to job site and used on project.

Field Quality Control Submittals:

Provide Scale Tags with following information:

Product Name.

Project Number.

Gallons/liters and pounds/kilograms of undiluted material supplied and used for Project.

Provide the amount of undiluted material used in terms of total gallons used, gallons per 1000/square feet used and square feet/gallon used.

Provide the amount of diluted material in terms of total gallons used, gallons per 1000/square feet used and square feet/gallon used.

Amount of water added to undiluted material.

Qualification Statement:

Installer / Supervisor:

Provide Qualification documentation if requested by Owner's Representative.

* + - * 1. Closeout Submittals:

Include following in Operations And Maintenance Manual specified in Section 01 7800:

Record Documentation:

Manufacturer’s documentation:

Asphalt Based Emulsion Seal:

1. Manufacturer’s product literature.
2. Design Data Submittal for Application Rate of Asphalt Based Emulsion Seal.
3. Source Quality Control Submittal.
	* + 1. QUALITY ASSURANCE
				1. Qualifications: Requirements of Section 01 400 1.06 applies but not limited to following:

Installer:

Minimum five (5) years experience in asphalt surface treatment installations.

Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding:

Project names and addresses.

Date of installations.

Supervisor:

Minimum of five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past five (5) years as Supervisor of Applicators:

Project names and addresses.

Date of installation.

Name of Supervisor or Owner.

Upon request, submit documentation.

* + - 1. FIELD CONDITIONS
				1. Ambient Conditions:

Asphalt Based Emulsion Seal:

Do not apply asphalt based emulsion seal when ambient temperatures will be less than 55 deg F (13 deg C) for twenty four (24) hour period or surface temperature will be less than 60 deg F (16 deg C) for twenty four (24) hour period.

Do not apply if subsequent temperatures for forty-eight (48) hours are anticipated to drop below 50 deg F (10 deg C).

Do not apply asphalt based emulsion seal if emulsion seal will not cure prior to freezing temperatures.

Do not apply asphalt based emulsion seal if it will be affected by rain, or during rain or when surface contains standing water.

1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Manufacturers:

Design Criteria:

Meet following requirements:

Manufacturers whose products meet requirements including Design Criteria of this Section.

Type One Acceptable Manufacturers and Products:

Asphalt Systems, Inc., Salt Lake City, UT (801) 972-6433 [www.asphaltsystemsinc.com](http://www.asphaltsystemsinc.com).

Ergon Asphalt & Emulsions, Inc., Jackson, MS [www.ergonasphalt.com](http://www.ergonasphalt.com).

Neyra Construction, Inc. Cincinnati, OH [www.neyraconstruction.com](http://www.neyraconstruction.com).

Nu Rock Asphalt Coatings, Clearfield, UT [www.nurockcoatings.com](http://www.nurockcoatings.com).

Quality Emulsions LLC, Lehi, UT [www.qualityemulsions.com](http://www.newqualityemulsions.homestead.com/).

Seal Coat Supply, Layton UT [www.sealcoatsupply.com](http://www.sealcoatsupply.com).

SealMaster, Sandusky, OH [www.sealmaster.net](http://www.sealmaster.net).

Equal as approved by Owner’s Representative before bidding. See Section 01 6200.

* + - 1. DESIGN CRITERIA
				1. Asphalt Based Emulsion Seal:

Base Emulsion:

Meet requirements of ASTM D977, Grade CSS-1h or meet requirements of AASHTO T 59-UL, Grade SS-1h.

**EDIT REQUIRED:** Include following paragraph if sand is to be added to asphalt based emulsion seal mix as determined in Part 3 of this specification with Owner's Representative and Contractor prior to bid and what rate amount to use, 1.0 lbs to 2 lbs per gallon (0.12 kg to 0.24 kg per liter) of sand passing a #30 mesh is common for providing skid resistance to asphalt based emulsion seal or where the asphalt is excessively rough.

Add sand at rate of 2.0 lbs/gallon (0.24 kg per liter) to undiluted asphalt based emulsion seal mix.

Materials, as manufactured, undiluted, except as noted, shall conform to following requirements:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Minimum | Maximum | Method |
| a. | Weight (per gallon/liter) | 10.0 lbs(4.5 kg) |  | ASTM D244 |
| b. | Cone Penetration | 340 mm | 700 mm | ASTM D217 |
| c. | % Non-Volatile | 50 |  | ASMA Standard Specification\* |
| d. | % Non-Volatile Soluble in Tri-Clorethylene | 10 | 35 | ASTM D2042 |
| e. | Wet Track Abrasion |  | 35 gram loss | ASTM D3910 |
| f. | Mineral Aggregate Components | #16 Sieve100% passing |  | ASTM C136/C136M |
| g. | Dried Film Color Viscosity | Black75 KREB |  | ASTM D562 |
| h. | Accelerated Weathering | No Deterioration |  | Fed Spec TT-C-555B |
| i. | Residual Asphalt | 20% by weight |  |  |
| j. | Water |  | 40% maximumby weight |  |
| k. | Residual Solids | 60%by weight |  |  |
|  | Latex Additive: Add at rate of 2.5 parts latex to 100 parts undiluted material. |

\*weigh 10 grams of homogenous product into previously tared, small ointment can. Place in a constant temperature oven at 325 degrees F for 90 minutes. Cool, reweigh and calculate non-volatile components.

* + - 1. MATERIALS
				1. Asphalt Based Emulsion Seal:

Design Criteria:

Manufacturer's Certification of compliance required.

Type One Acceptable Products:

Asphalt Systems: GSB – Seal Coat.

Ergon Asphalt: Plastic Seal.

Invia: Axys Mastic Surface Treatment.

Nevra: PaveShield.

Nu Coal: Axys Mastic Surface Treatment.

Quality Seal LLC: Quality Seal.

Seal Coat Supply: Tuff Coat.

SealMaster: Polymer Modified MasterSeal (PMM).

Equal as approved by Owner’s Representative before bidding. See Section 01 6200.

**EDIT REQUIRED:** Include following paragraph if sand is to be added to asphalt based emulsion seal mix as determined in Part 3 of this specification with Owner's Representative and Contractor prior to bid.

* + - * 1. Sand:

General:

Washed dry silica sand free of dust, trash, silt, clay, salts, and organic materials or other contaminates.

Gradation:

Fineness number that is no less than fifty (50) and no more than seventy (70) (50 to 70 mesh AFS rating), when testing in accordance with ASTM C136/C136M. Blend of 15 grit and 30 grit sand is acceptable. Gradation outside these ranges may be used provided past history shows evidence of a durable surface.

**EDIT REQUIRED:** Include following paragraph if Tack Coat is to be used as determined in Part 3 of this specification with Owner's Representative and Contractor prior to bid.

* + - * 1. Tack Coat:

Design Criteria:

Apply Tack Coat if determined in the Evaluation and Assessment in Part 3 of this specification with Owner's Representative and included in bid.

Tack coat is recommended when using asphalt emulsion based sealcoat over pavement previously treated with coal tar. It is preferred to let coal tar wear out before applying an asphalt based emulsion seal.

Use tack coat on older pavements that are highly oxidized or weathered and show signs of raveling, and surface distress to improve sealer adhesion.

Use tack coat if existing paving cannot be thoroughly cleaned.

Tack coat is not to be considered as one of two (2) required applications of refined coal tar emulsion seal.

Same type of asphalt used in asphalt based emulsion seal is to be used for tack coat.

Use tack coat when using asphalt emulsion based sealcoat over pavement previously treated with coal tar. It is preferred to let coal tar wear out before applying an asphalt based emulsion seal.

Manufacturer's Certification of compliance required.

Type One Acceptable Products:

GSB-78 Pavement Sealer and Rejuvenator by Asphalt Systems.

Equal product that meets design criteria for tack coat as approved by Owner’s Representative before bidding. See Section 01 6200.

1. EXECUTION
	* + 1. EXAMINATION

**EDIT REQUIRED:** Edit this specification accordingly based on decisions from the Evaluation and Assessment of Project with Owner's Representative and Contractor.

* + - * 1. Evaluation And Assessment:

Examine Project Site with Owner's Representative prior to bid with Contractor:

Sand added to asphalt based emulsion seal mix: Determine what amount of sand top use. 1.0 lbs per gallon (0.12 kg per liter) is common for providing skid resistance to asphalt based emulsion seal.

Asphalt Based Emulsion Seal Coats: Determine if additional asphalt based emulsion seal coats are necessary to attain Manufacturer's recommended coverage including the following:

Additional third coat of asphalt based emulsion seal coat required everywhere.

Additional third coat asphalt based emulsion seal coat required in drive aisles and entries only.

Paint Stripes: Verify if acrylic, thermoplastic or paint stripes must be removed in preparation of asphalt based emulsion seal application.

Tack Coat: Determine if tack coat is to be used and if used, what type and amount of tack coat to be used.

* + - 1. PREPARATION
				1. Owner Responsibilities:

Remove Ward Trailer(s) if needed.

* + - * 1. General:

Do not allow irrigation watering for at least twenty-four (24) hours prior to application.

* + - * 1. Equipment:

Spray Equipment:

Capable of spraying pavement asphalt based emulsion seal with sand added.

Equipped with positive displacement pumps to ensure uniform application of sealer.

Self-Propelled Squeegee:

Provide at least two (2) squeegee or brush devices (one behind the other) to assure adequate distribution and penetration of asphalt based emulsion seal into bituminous pavement.

Mechanical Squeegee:

Provide at least two (2) squeegee and/or brush assemblies (one behind the other) to assure adequate distribution and uniform application of refined coal tar emulsion seal.

Hand Squeegee and Brushes:

Use of hand squeegee or brushes is restricted to areas not accessible to mechanized equipment or to accommodate neat trim work at curbs, parking stops and so forth.

Acceptable in areas where practicality prohibits use of mechanized equipment.

Equipment used must be capable of keeping material thoroughly mixed and homogeneous throughout application process.

Equipment used must be capable of supplying sufficient quantity of material for uniform application over entire width of application mechanism to provide uniformly coated surface.

* + - * 1. Protection Of In-Place Conditions:

Asphalt Based Emulsion Seal:

Protect sign posts, street lamp posts, trees, shrubs, and tops of curbs and gutters from being discolored by splashing asphaltic material.

* + - * 1. Surface Preparation:

Paint Stripes:

During Evaluation and Assessment as specified in Part 3 of this specification, verify if acrylic, thermoplastic or paint stripes must be removed in preparation for asphalt based emulsion seal application.

If new paint stripes will not match exact location of existing paint stripes that will not be removed, then paint stripes must be removed or be covered with black acetone based paint.

Grease or Oil Patches:

Remove grease or oil patches, and spillage of any material that has adhered to pavement. Do not place seal over unsound oil spots softened by fuel or oil.

Clean oil spots and treat with oil spot primer.

Seal areas damaged by oil or grease with an oil spot primer compatible with tack coat or seal being used in accordance with Manufacturer's recommendations.

Cleaning:

Remove all debris, dirt, dust, leaves, loose material, moisture, mud spots, sand, silt spots, vegetation (including moss), water and other objectionable and foreign material from existing surface prior to placing tack or seal. In areas where moss is prevalent, apply herbicide.

Power brooms, power blowers, air compressors, vacuum sweepers, rotary brooms, water flushing equipment, and blowers, or by another approved method.

Cracks:

Repair cracks if required per Section 32 0117.01 ‘Asphalt Paving Crack Seal’ or Section 32 0117.02 ‘Asphalt Paving Crack Fill’ prior to placing asphalt based emulsion seal. Cracks that contain weed and other live vegetation matter must be treated with Pre-Emergent Herbicide prior to crack repair.

**EDIT REQUIRED:** Include following paragraph if Tack Coat is to be used as determined in Part 3 of this specification with Owner's Representative and Contractor prior to bid.

Tack Coat:

Follow asphalt based emulsion seal Manufacturer's recommendations for substrate preparation and application of tack coat to substrate.

Roughen surface of any existing coal tar seals with wire brush.

Same type of asphalt used in emulsion seal is to be used for tack coat.

* + - 1. APPLICATION

**EDIT REQUIRED:** Include following paragraph if Tack Coat is to be used as determined in Part 3 of this specification with Owner's Representative and Contractor prior to bid.

* + - * 1. Tack Coat:

Apply tack coat as per Manufacturer’s recommendations:

Use one (1) part undiluted asphalt based emulsion and three (3) parts water at rate of 0.05 to 0.10 gal per sq yd (0.23 to 0.45 L per sq m).

* + - * 1. Asphalt Based Emulsion Seal:

Surface preparation:

Do not apply asphalt based emulsion seal until completion of preparation items.

Follow Seal Manufacturer's recommendations in regard to fogging of substrate, application of tack coat to substrate, application of prime coat to substrate, priming of substrate, and dilution of asphalt based emulsion seal.

Apply asphalt based emulsion seal using power driven machine that continually mixes asphalt based emulsion seal, water, and sand.

Apply two (2) separate asphalt based emulsion seal coats minimum in all areas. Allow first, or subsequent asphalt based emulsion seal coats to dry before applying next coat:

**EDIT REQUIRED:** Edit accordingly following paragraph if additional emulsion coats are to be used as determined in Part 3 of this specification with Owner's Representative and Contractor prior to bid.

Apply additional asphalt based emulsion seal coat:

Additional asphalt based emulsion seal coat required everywhere.

Additional asphalt based emulsion seal coat required in drive aisles and entries only.

Allow individual asphalt based emulsion seal coats to dry prior to applying additional coats which can take up to twenty four (24) hours.

* + - * 1. Paint Stripes:

If paint stripes were removed in preparation for asphalt based emulsion seal, include following:

Apply paint stripes after asphalt based emulsion seal has been applied and cured.

* + - 1. CLEANING
				1. General:

Upon completion of asphalt based emulsion seal operations, clean up and remove debris.

* + - 1. PROTECTION
				1. Do not allow traffic on paving until asphalt based emulsion seal is thoroughly cured:

Warm weather condition is approximately twenty-four (24) hours.

* + - * 1. Do not allow irrigation watering for at least twenty-four (24) hours after application.

END OF SECTION