

SECTION 07 27 01
INTERIOR AIR AND VAPOR CONTROL LAYER

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. INTERIOR AIR AND VAPOR CONTROL LAYER, including surface preparation.

1.2 RELATED SECTIONS

- A. Section 07200 – Thermal Protection.
- B. Section 07270 – Weather Resistive wind tight layer (membrane)
- C. Section 07272 – Airtight tapes
- D. Section 07500 – Membrane Roofing.

1.3 REFERENCES

- A. ISO 9972:2006 / EN 13829 -- Determination of air permeability of buildings, Fan pressurization method
- B. ASTM E779 – Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
- C. ASTM E84 - Standard test method for surface burning characteristics of building materials.
- D. ASTM E2178 - Standard Test method for. Air Permeance of Building Materials
- E. AATCC 127 – Hydrostatic pressure test
- F. ISO 12572 - Hygrothermal performance of building materials and products
- G. EN 1849-2 - Flexible sheets for waterproofing - Determination of thickness and mass per unit area
- H. EN 12114 - Thermal performance of buildings - Air permeability of building components and building elements
- I. EN 12310-1 - Flexible sheets for waterproofing. Determination of resistance to tearing (nail shank)
- J. EN 12311-2 - Flexible sheets for waterproofing. Determination of tensile properties.
- I. EN 13859-1 - Flexible sheets for waterproofing - Underlays for discontinuous roofing/(sheathing)
- J. EN 1296 - Flexible sheets for waterproofing - Method for artificial ageing by long term exposure to elevated temperature
- K. EN 1931: Determination of water vapor transmission properties

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Installation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
- C. Verification Samples: For each product specified, two samples.
 - 1. Membranes: minimum size 6"x8"
 - 2. Tapes: minimum length 5"
 - 3. Gaskets, adhesives, accessories: one each

1.5 QUALITY ASSURANCE

- A. Performance target: required airtightness level for this project is ___ air changes per hour (ACH50). Minimum acceptable air-tightness level is **1.0 ACH50 or 0.15CFM/sf75** for buildings over 20,000SF
- B. Installer Qualifications: Comply with one of the following requirements:
 - 1. The (sub-)contractor installing the interior airtight layer shall have as minimum experience with at least two buildings that was independently tested below **1.0ACH or 0.15CFM/sf75**
 - 2. The (sub-)contractor has completed the "Make it tight" training with 475 High Performance Building Supply

- C. Due to their superior technical performance and durability, only products made by Pro Clima in Germany are acceptable for the construction of the interior airtight layer.

**** NOTE TO SPECIFIER **** Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up might be specified. When defining the extent of the mock-up, consider all corner connections and other complications (sequencing) that disrupts the interior airtight layer.

- D. Mock-Up: Provide a mock-up for evaluation of installation techniques and application workmanship.
 - 1. Prior to installation of airtight layer, mock up airtight layer as follows to verify details and to demonstrate connections to adjoining construction elements, and other termination conditions.
 - 2. Install mockup of airtight layer in location designated by Architect.
 - 3. Do not proceed with remaining work until workmanship and application technique are approved by Architect.
 - 4. Construct typical interior wall, 8 feet wide by 8 feet long, illustrating materials interface and connections (tape, adhesives, gaskets), incorporating specified options including but not limited to the following:
 - a. junctions of walls, foundations, ceilings, floors and roof,
 - b. corner conditions
 - c. window and doorframe connections, and
 - d. blow-in insulation seals/battens.
- E. Cooperate and coordinate with the owner's inspection and (blowerdoor) testing agency. Do not cover (with sheetrock, blocking, mechanical equipment or other elements that would restrict access to the airtight membrane) any components of the mock up (installed airtight layer membrane or other airtight elements) until it has been inspected, blowerdoor tested and approved.

1.6 PRECONSTRUCTION MEETING

- A. Preconstruction Meeting: Convene a meeting with all subcontractors affected by the Work of this Section a minimum of one week prior to commencing work of this section. Agenda shall include materials, details of construction, compatibility of materials, sequencing of construction/installation of membranes, the airtightness goal and emphasize that the success during the blowerdoor test is dependent on the collaboration of all subcontractors.
- B. Coordinate Work with other subcontractors (plumbers, electricians, carpenters, HVAC), operations and installation of finish materials to install correct-sized gaskets on pipes, ducts and cable when these elements pass through the interior airtight layer, and to avoid damage to installed materials. Before they commence work on site, provide each effected trade with sufficient gaskets.
- C. After meeting, post the following warning in a prominent location at all building entrances and top of each stair – 1/2" letter height minimum for header, 1/4" for all other text

<p>AIRTIGHT BUILDING</p> <p>No drilling, airtight construction: no cutting, airtight membranes</p> <p>Report all penetrations to supervisor</p>

Translate into additional languages if required/as appropriate. (Available from foursevenfive.com)

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials on pallets. in clean and dry areas, not exposed to direct sunlight and in accordance with manufacturer's instructions. Store adhesives and primers at temperatures at or above 40 degrees Fahrenheit (4 degrees Celsius) to facilitate handling.
- C. Protect materials during handling and application to prevent damage, puncturing or contamination.

1.8 ENVIRONMENTAL CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) as per manufacturers recommendations. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Minimize exposure of airtight membranes to direct sunlight. Use blinds or covers over window openings to block direct sunlight to prevent UV damage to membranes, if membranes will not be covered by sheetrock within 2 weeks or use exterior grade products (INTELLO X or SOLITEX line)
- C. Minimize exposure to water. If exposure is likely, expected or cannot be avoided, use exterior grade products (INTELLO X or SOLITEX Line).

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Pro Clima/Moll bauökologische Produkte GmbH, 68723 Schwetzingen Germany. Imported by 475 High Performance Building Supply, 334 Douglass street, Brooklyn NY, Tel: 718-622-1600; Email; info@foursevenfive.com; Web: www.foursevenfive.com / www.foursevenfive.ca
- B. Substitutions: Not permitted.

2.2 AIRTIGHT LAYER SYSTEMS

- A. INTELLO Plus
 - 1. Description: Intelligent vapor retarder (Hydrosafe) made from polyethylene copolymer membrane with polypropylene reinforcement grid
 - 2. Airbarrier/smart vapor retarder is protected with PP cover fleeces on top and bottom
 - 3. Class A rated material per ASTM E84 (Flame spread: 0, SDI:35)
 - 4. Airtight material per ASTM E2178: 0.00005cfm/sf
 - 5. Appearance: Translucent white
 - 6. Weight 0.36 oz/sf ±15 g/m² (110g/m²) EN1849-2
 - 7. Thickness: 16 mils (0.4 mm ±0.1 mm) EN1849-2
 - 8. Perm rating: 13.20 to 0.13 (Sd value from 0.25m to >25m) ISO 12572
 - 9. Temperature exposure limits: -40 to 176 degrees F (-40 to 80C)
 - 10. Tensile Strength (EN13859-1)
 - a. 350 N/50 mm MC
 - b. 290 N/50 mm DC
 - 11. Elongation (EN13859-1)
 - a. 15% (MC)
 - b. 15% (DC)
 - 12. Nail Tear Resistance: 200N/200N (MC/DC) EN 13859-1
 - 13. Permeability consistent after artificial age testing: Pass – DIN EN 1296/1931
 - 14. Living Building Challenge Declare label – red list free
- B. INTELLO X:
 - 1. Description: High performance vapor variable (Hydrosafe) membrane and temporary WRB for commercial buildings. Made from Polyehylene-Copolymer protected with two robust PP fleex
 - 2. 3 layer material – includes two robust PP protection fleeces that protect smart vapor retarder. Suitable to use as temporary roof or WRB during construction.
 - 3. Class A rated material per ASTM E84 (Flame spread: 0, SDI:105)
 - 4. Airtight material per ASTM E2178: 0.00005cfm/sf
 - 5. Appearance: Translucent white
 - 6. Weight 0.6 oz/sf ±0.5 g/m² (150g/m²) EN1849-2
 - 7. Thickness: 18 mils (0.45 mm ±0.05 mm) EN1849-2
 - 8. Perm rating: 13.20 to 0.13 (Sd value from 0.25m to >25m) ISO 12572
 - 9. Temperature exposure limits: -40 to 176 degrees F (-40 to 80C)
 - 10. Tensile Strength (EN13859-1)
 - a. 250 N/50 mm MC
 - b. 170 N/50 mm DC
 - 11. Elongation (EN13859-1)
 - a. 60% (MC)

- b. 60% (DC)
 - 12. Nail Tear Resistance: 27/27 lbf 120N/120N (MC/DC) EN 13859-1
 - 13. Permeability consistent after artificial age testing: Pass – DIN EN 1296/1931
 - 12. Water column 8.2ft (2.5m) AATCC 127 – DIN EN 20811
 - 12. UV and weather exposure: 2 months
- C. DB+
- 1. Description: Intelligent paper based vapor retarder, recycled paper with PE and a bi-directional fiberglass reinforcement grid.
 - 2. Appearance: light blue
 - 3. Weight 0.6 oz/sf (190 ±10 g/m²) DIN EN 1849-2
 - 4. Thickness: 9 mils (0.23 ±0.1mm) DIN EN 1849-2
 - 5. Perm rating: 8.2 to 0.8 (Sd value from 0.4m to 4m) ISO 12572
 - 6. Temperature exposure limit: up to 104 degrees F
 - 7. Tensile Strength (EN13859-1)
 - a. 550 N/50 mm MC
 - b. 420 N/50 mm DC
 - 8. Elongation (EN13859-1)
 - a. 5% MC
 - b. 5% DC
 - 9. Tear Resistance: 70N/70N (MC/DC) EN13859-1
 - 10. Permeability consistent after artificial age testing: Pass – DIN EN 1296/1931
- D. Airtight interior tape: TESCON VANA:
- 1. Solid Acrylic tape with PP carrying fleece
 - 2. Perm rate: 8 (sd-value 0.4m) DIN EN1931
 - 3. Adhesion (ASTM D3330): 4.45Lbs/lin.inch INTELLO, 3.34lbs/lin/inch OSB
 - 4. Artificial age test: 100 years (per DIN 4108-7)
 - 5. Living Building Challenge Declare label – red list free
 - 6. Free of VOCs
- E. Airtight interior corner tape: TESCON Profil or TESCON Profect, Solid Acrylic tape with PP carrying fleece and split release paper: Living Building Challenge Declare label – red list free, free of VOCs
- F. Airtight window tape: CONTEGA SOLIDO SL(-D): vapor retarding window tape with multiple release papers for specific or blind taped window airsealing.
- H. Airtight adhesive: CONTEGA HF (contains VOC's/bio-ethanol) or CONTEGA Classic (VOC free), CONTEGA MULTIBOND (pre-cure adhesive on roll): non-embrittling adhesives for membrane connections to concrete, plywood floors and very rough/split wood.

2.3 ACCESSORIES

- A. PRESSFIX tape pressurization tool.
- B. Primer: TESCON Primer RP (for brick or concrete):
 - 1. Acrylic-copolymer based primer
 - 2. Application Temperature: Above 15 degrees Fahrenheit (-10 degrees Celsius)
 - 3. VOC free
- C. Pipe, duct, cable sealing: ROFLEX and KAFLEX gaskets
 - 1. EPDM gaskets per specific pipe sizes
 - 2. Tape with TESCON VANA to airtight layer
- D. Outlet sealing (recessed): INSTAABOX / LESSCO boxes
 - 1. Self sealing airtight outlet box
 - 2. Tape with TESCON VANA to airtight layer
- D. Metal studs: Fastweb strips or cap screws

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates/surfaces have been properly prepared and cleaned from dust, silicones, oils and grease. Before installation, verify substrate is free of splinters, nails or other objects that could puncture membranes.
- B. If window or door opening preparation is the responsibility of another installer, notify architect of unsatisfactory preparation before proceeding.
- C. If there are unexpected pipes, ducts or wires in the installation area/airtight layer or these penetrations do not have ROFLEX/KAFLEX gaskets around them, notify architect of unsatisfactory preparation before proceeding.
- D. If floor, walls or ledger boards have been built that interfere with the airtight layer and a drawn/planned pre-installed airtight membrane was not installed as per sequencing plan, notify architect of unsatisfactory preparation before proceeding.
- E. If long term exposure to UV or liquid water is likely or can be expected – USE INTELLO X or SOLITEX membranes only.
- F. Acceptance of Conditions: Beginning of installation constitutes acceptance of existing conditions.

3.2 PREPARATION

- A. Clean and prepare surfaces to receive air/vapor barrier in accordance with manufacturer's installation guidelines.
- B. All surfaces must be clean, smooth and dry and must be clean of oil, dust, and silicone.
- C. Batt installation: install membrane immediately after batt insulation is installed in winter.
- D. Properly ventilate space or use dehumidifier to prevent high humidity conditions after concrete pours, sheetrock compounding and tile work . Monitor humidity if needed to ensure it stays below 60% relative humidity.

3.3 APPLICATION

- A. Apply airtight layer/vapor retarder in accordance with manufacturer's instructions.
- B. Install membranes taut and without creases along the substrate.
- C. Overlap subsequent courses of membrane. Use the printed lines on the membrane as a guide.
- D. Mechanically fasten as per 475 installation manuals
- E. Battens for service cavities for densepacking should be spaced less than 20" o.c. and be perpendicular to the direction of the structure behind. Or other means should be employed to mechanically fix the membrane sufficiently to the substructure to long term support the weight/force exerted by the insulation – please contact 475 for additional means and methods.
- D. Tape all overlaps. Use a PRESSFIX tape pressurization tool to ensure there is sufficient back-pressure when applying the pressure sensitive Pro Clima tapes. Make sure that tape joints are not permanently

under stress, ie are supported by a batten or by cross taping the taped joint with 12" long pieces of tape every 12"

- E. Overlap the membrane a minimum of 2" over dissimilar airtight materials (concrete, plaster).
- F. Use CONTEGA HF (for below 0F application) or CONTEGA classic (VOC free) or MULTIBOND to adhere membranes to concrete, brick, plaster or rough OSB. Leave some slack in the membrane to allow for expansion and contraction between these dissimilar materials. Prime substrates with TESCON Primer RP if necessary.
- G. If taping to membrane to porous or unknown substrates, they should be free of oil, silicone and dust. Do an adhesion test when in doubt. Primer recommended for application to brick, concrete, wood fiber insulation board and certain OSB brands.
- H. Cut membrane with a utility knife in detail around penetrations.
- I. Seal membranes to windows, joist and beams with TESCON Profil or CONTEGA line of airtight window tapes. Follow application guides of specific tapes.
- J. Seal all penetrations with gaskets (ROFLEX or KAFLEX) taped with TESCON VANA airtight tape to airtight layer. Air seal around pre-existing penetrations (pipes, ducts or cables) with TESCON VANA tape in step like fashion, avoiding creases in tape.
- K. Apply blown in insulation directly after installing interior airtight membranes.
- L. Inspect membrane before blowerdoor test and/or dense-packing insulation. Ensure:
 - 1. each overlap is taped and has been pressurized
 - 2. staples applied at appropriate intervals
 - 3. counter battens at recommended distances
 - 4. tears and punctures repaired with Pro Clima tape
 - 5. adhesives (CONTEGA HF or classic) have had 48 hours to set up before test.

3.4 TESTING

- A. Do a blowerdoor test as soon as the airtight layer is completely installed. During the test search for any detectible leaks with hands, IR or smoke pencils.
- B. Document any leaks, and repair with Pro Clima tapes, adhesives and accessories.
- C. Repeat test until building complies with project airtightness (ACH50 or CFM/SF75) goal, but at a minimum better than 1.0ACH50 or 0.15CFM/SF75
- D. Re-do blowerdoor test if more than 3 holes/penetrations are made following completion of blowerdoor test above, or at the request of the architect.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Repair tears, punctures or burns (e.g. from sweating copper pipe) and/or replace damaged products before covering materials. Re-do blowerdoor test if more than 3 holes are made or by request of architect.
- C. To protect interior airtight layer/membranes, apply service cavity insulation and sheetrock as soon as possible, and not later than specified exposure limit of used materials. Use tarps or other means of blocking UV if exposure times will be exceeded to protect membranes.

3.6 FINAL TEST

- A. Blowerdoor test the installed membrane/interior airtight layer when:
 - 1. All penetrations have been made and sealed.
 - 2. Sheetrock and other finishes on exterior walls have been installed.
- B. Find and repair leaks.
- C. Repeat testing and repairs until the project complies with the project airtightness goal.

END OF SECTION