

**Tentative Specifications**  
**FOR**  
**HEAVY DUTY OXYCHLORIDE COMPOSITION FLOORING**  
**AND**  
**ITS INSTALLATION**



**OXYCHLORIDE CEMENT ASSOCIATION, INC.**  
1028 CONNECTICUT AVENUE  
WASHINGTON 6, D. C.

Tentative Specifications

for

HEAVY DUTY OXYCHLORIDE COMPOSITION FLOORING

AND

ITS INSTALLATION

488.3

OCA-102

Revised February 1, 1950

SCOPE

1. These specifications cover heavy duty oxychloride composition flooring, with respect to quality of materials and workmanship, installation, finishing and testing.

USES

2. The physical characteristics of this Heavy Duty type of oxychloride cement flooring make it adaptable for use as a surfacing for areas which are subjected to heavier service than that for which General Purpose flooring (OCA-101) is designed. (Note 1.)

MATERIALS

3. Dry Mix. - (a) The oxychloride composition shall consist of an intimately machine-mixed compound of dry ingredients, which, at the time of installation, will set to a hard, dense product, as specified herein, when mixed with the gauging solution specified.

(b) All ingredients shall be dry, and shall be accurately proportioned and compounded by weight, mechanically mixed, and shall consist of caustic-calcined magnesia conforming to requirements of specification OCA Designation 500-10; inert fillers, such as talc in proportions not to exceed 3 per cent of the weight of the dry mix, siler, marble flour, asbestos in proportions not to exceed 5 per cent of the weight of the dry mix, wood flour, and sawdust; inert aggregates (which are not affected by cleaning compounds), such as sand, fine crushed stone, or other fine, chemically inert, low-absorbent, physically strong aggregates; inorganic pigment (optional). All materials used shall be alkali-resistant and free from injurious amounts of deleterious materials, such as salts, clay and silt. (See Note 2.)

(c) Fibrous aggregate, fine aggregate and filler materials shall conform to the following requirements in respect to particle size gradation:

Sieve	Per Cent Passing		
U. S. Number*	Wood Flour, Sawdust and Asbestos	Sand, Fine Crushed Stone, etc. (1)	Talc, Siler, Marble Flour
6		100	
20	100		
30		80 max.	
50	80 max.		
100		7 max.	100
200			95 max.

(1)  
Well graded in the sieve ranges specified.

As Designated by ASTM Standard F11-39

(d) Fibrous materials not susceptible to screen analysis may be used provided all other requirements of this specification are met.

(e) Fibrous fillers shall be of such nature that the final finish, under service, will not become fuzzy.

(f) Use of premixed dry ingredients which have become lumpy shall not be permitted.

(g) The dry mix of oxychloride flooring composition which is to be used in contact with aluminum alloys shall contain 1.5 per cent (by weight) of potassium dichromate.

4. Gauging Solution. - (a) The gauging solution shall be a water solution of magnesium chloride complying with requirements of OCA Specification Designation 500-11-46. The specific gravity of the gauging solution shall be  $22.0 \pm 0.5^\circ$  Baume when tested in accordance with Specification OCA Designation 350-11-50. Water used shall be clean and free of deleterious amounts of acids, alkalies, salts, or organic materials. (See Note 3.)

(b) Alternate Gauging Solution. - As an alternate for that specified in Section 4 (a) a gauging solution containing magnesium sulfate may be used. This shall be a water solution of magnesium chloride and magnesium sulfate complying with the requirements of the Specifications for Magnesium Chloride (OCA Designation 500-11-46), and the Specifications for Magnesium Sulfate (OCA Designation 500-12-48), respectively, of the Oxychloride Cement Association. The weight of the magnesium sulfate, calculated as  $MgSO_4 \cdot 7H_2O$ , shall be ten per cent (10%) of the weight of the magnesium chloride, calculated as  $MgCl_2 \cdot 6H_2O$ . The specific gravity of the gauging solution shall be  $24.0 \pm 0.5^\circ$  Baume at 70 F when tested in accordance with method OCA Designation 350-11-50. Water used shall be clean and free of deleterious amounts of acids, alkalies, salts, and organic materials. (See Note 3)

(c) Solutions shall be prepared sufficiently in advance to permit their being cooled to at least room temperature before using. Care shall be exercised to insure complete solution of all crystalline material and to insure thorough mixing.

5. Strips. Division strips, base dividers or ornaments, when required, shall be formed from oxychloride cement, brass, stainless steel, monel metal, aluminum alloys (see note), or plastics which are chemically resistant to the cement. Aluminum alloy divider strips shall be coated with an alkali resistant clear lacquer or bituminous paint and the oxychloride composition used when aluminum alloy divider strips are included shall conform to the requirement of Section 3 (g).

Note:-Corrosion resistant aluminum alloys shall be used. These include those using alloy additions of silicon, magnesium, chromium with copper content not exceeding 0.4 per cent; and clad products such as Alclad 3S, Alclad 4S, Alclad 24S, or others of equal resistance to corrosion. *Manganese*

6. Certification of Raw Materials. - Contractor shall certify to the architect or owner that the magnesium oxide, magnesium chloride, magnesium sulfate, fillers and aggregates conform to specifications designated in Sections 3, 4 and 5.

#### COMPOSITION

7. The flooring shall be compounded strictly according to the formula used in making the sample or samples approved by and on file with the architect or owner and the composition shall be such as to yield a finished floor essentially the same as or

better in appearance than the approved samples. The composition shall contain fibrous aggregate, fine aggregate and sufficient filler materials to permit troweling to a smooth trowel finish.

#### MIXING

8. The dry ingredients shall be placed in a clean mortar box or clean mechanical mixer, the specified gauging solution added in an amount corresponding to not less than 6.7 lb. of MgO in the dry mix per gallon of gauging solution (not more than 0.149 gal. of gauging solution per pound of MgO), and the mass mixed until it is free from lumps. In no case shall the material be retempered for use by addition of gauging solution after it has become too stiff to be applied.

#### CONSISTENCY

9. The wet mix, prepared as specified in Section 8, shall slump not more than 6 inches when tested in accordance with Specification OCA Designation 350-12-50. Sample for test shall be taken immediately after completion of mixing.

#### CONDITIONING OF WORKING AREA

10. In spaces where the floor is to be laid the temperature shall not be less than 50 F and shall not exceed 95 F until final set is attained. The prevailing temperature shall be maintained substantially uniform in a stipulated range, and shall not decrease more than twenty degrees from the temperature at the time of installation for at least twenty-four hours after placing. Heating shall not be accomplished by the use of salamanders. Convection heating may be employed, provided local overheating is avoided, or air not exceeding 70 F may be used in forced circulation providing its velocity at the floor level is not in excess of 500 cu. ft. per min. at any location. Openings are to be kept closed or so arranged as to prevent harmful circulation of air. All water and steam connections from which leaks might affect the oxychloride flooring shall be made tight before placing of the oxychloride coating is begun.

Note:-It is recognized that, with the specified temperature range, conditions of low relative humidity may be encountered in arid areas which can deleteriously affect linear change characteristics and strength of an installation. Humidification of the atmosphere of the working area is recommended when such conditions are encountered.

#### PREPARATION OF SUBFLOORS

11. (a) The flooring composition shall be laid on either an oxychloride composition basecoat laid in accordance with the specification for Oxychloride Composition Basecoat, Type 2 (OCA Designation 100-50) or a subfloor which has been prepared in accordance with the specification for Preparation of Subfloors to Receive Oxychloride Composition Flooring (OCA Designation 200-50).

(b) Prepared subfloors or basecoats shall be protected from injury and the surface shall be free from any substance deleterious to the formation of a bond, such as water, dust or grease.

#### METHOD OF APPLICATION

12. (a) When the floor is to be laid on an absorptive surface (such as oxychloride composition basecoat, concrete, ~~and some masonry surfaces~~), this surface shall be thoroughly dampened with gauging solution at full strength, leaving no

puddles. The surface shall then be broomed with a thin slurry prepared from gauging solution and either the dry mix or straight caustic-calcined magnesia. Areas prepared in this manner must then be covered with the flooring composition as specified in Section 12 (c) before the surfaces set or acquire a glaze.

(b) When the floor is laid on a non-absorptive surface where an anchoring medium is employed, a thin layer of the flooring composition shall be thoroughly worked into and around the anchors. Application of additional flooring composition shall then be made as specified in Section 12 (c).

(c) After preparation of the subfloor surfaces as specified in Section 12 (a) or 12 (b) a thin layer of the flooring composition shall be thoroughly worked into all recesses and depressions by scraping with a trowel just prior to spreading the flooring mix. The flooring composition shall then be spread to the specified thickness, leveled by darbying, and finished by means of at least two steel trowelings. The final troweling shall be delayed until the composition has acquired sufficient set so that this operation (hard troweling) will produce a smooth hard surface free from laitance.

(d) Oxychloride composition coves and bases and wainscots may be installed integrally with the floor, and the same specifications shall apply as if the mix were laid as flooring.

(e) When metal grids are used, these shall be installed in accordance with the manufacturer's specifications for the selected type.

#### THICKNESS

13. (a) The thickness of the flooring at any point shall conform to the following requirements:

	Thickness	
	<u>Not Less Than</u>	<u>Not More Than</u>
On Oxychloride Composition		
Base Coat Type 2	1/2"	1"
On all Other Subfloors	5/8"	1"

(b) The heavy duty oxychloride floor may be installed in one or more coats. If oxychloride is applied as basecoat this basecoat shall conform to the requirements of either these specifications or the Specifications for Oxychloride Basecoat Compositions, Type 2, OCA Designation 100 (latest revision) of the Oxychloride Cement Association.

#### SEALING

14. (a) The floor shall be thoroughly cleaned after final set so that it is free from all foreign materials, laitance, etc., and shall be sealed with a sealer of low viscosity and which will maintain a low viscosity after at least 30 minutes' exposure in the form of a thin film to a normal atmosphere at a temperature of 80 F. Such sealers shall impart a uniformly water-repellent or water-impervious character to the surface of finished floor.

(b) The floor surface shall be wet with an excess of the penetrating sealer for at least 30 minutes, after which the excess sealer shall be removed from the surface by means of rags or mop, or by means of sawdust spread over the floor surface to absorb the excess sealer and then completely removed by sweeping. The floor surface shall be free from any substantial surface coating after removal of the excess sealer.

## PROTECTION OF FINISHED INSTALLATION

15. (a) After sealing, the floor shall then be covered and protected with sawdust, absorbent paper, or other suitable water-vapor-permeable material until the completion of the work of other trades. Areas used for trucking shall be adequately protected from injury by means of temporary false flooring.

(b) All traffic shall be kept off the finished floor for at least forty-eight hours after the installation has been completed. The finished floor shall not be scrubbed or flooded with water for at least fifteen days after installation is completed.

## PHYSICAL REQUIREMENTS

16. Heavy Duty Oxychloride Composition Flooring shall conform to the following physical requirements when tested in accordance with the respective methods as listed in Section 21:

(a) Linear Change, 1 to 7 days, shall be within the limits +0.040 to -0.050 per cent.

(b) Transverse Strength at 7 days, minimum 1600 pounds per square inch.

(c) Compressive Strength at 7 days, minimum 6000<sup>7500</sup> pounds per square inch.

## WORKMANSHIP

17. The prepared mix shall be laid to the specified thickness, in accordance with drawing details, by qualified workmen, to produce the finished surfaces as specified.

## SUPERVISION

18. The contractor shall give his personal supervision to the work or provide a competent foreman or superintendent with authority to act for him, who shall be present throughout the entire progress of the installation.

## INSPECTION

19. The architect or owner reserves the right to conduct any inspection or make any test deemed necessary to determine conformance with the requirements of this specification. Samples approximately 12" x 12" or of other specified size and representative of the finished floor may be requested by the architect or owner for selection of the desired color and finish and for filing in connection with acceptance inspection.

## SAMPLING

20. (a) The architect or owner reserves the right to take, at the time of or prior to installation, representative composite samples, for testing, of materials from each lot offered for delivery, in accordance with the Specifications OCA Designation 350-13-49. The minimum quantities of these samples shall be as follows:

Premixed dry ingredients	20 pounds
Gauging Solution	2 gallons
Additives (Notes 2 and 3)	1 pound

(b) Samples thus obtained shall be placed in separate clean, dry, airtight, waterproof containers, securely closed, distinctly labeled and dated. Any tests performed shall be completed within 30 days from date of sampling.

#### METHODS OF TEST

19. All methods of test shall conform to those of the American Society for Testing Materials or the Oxychloride Cement Association, Inc., designated as follows:

	A.S.T.M	OCA
Sieve Analysis of Magnesium Oxychloride Compositions	C 238-49T	300-10-49
Sampling Oxychloride Compositions and Ingredients	C 237-49T	350-13-49
Field Determination of Specific Gravity of Gauging Solution		350-11-50
Slump Test for Consistency of Magnesium Oxychloride Cements		350-12-50
Mixing Oxychloride Cement Compositions with Gauging Solution		300-20-50
Consistency of Magnesium Oxychloride Cements by Means of a Flow Table		300-12-50
Setting Time of Magnesium Oxychloride Cements		300-15-50
Transverse Strength of Magnesium Oxychloride Cement Compositions		300-13-49
Compressive Strength of Magnesium Oxychloride Cement Compositions		300-14-49
Linear Change of Magnesium Oxychloride Cements		300-16-50
Magnesia for Magnesium Oxychloride Cements:		
Ignition Loss of Magnesia		400-1-50
Active Calcium Oxide in Magnesia		400-2-50
Sieve Analysis of Plastic Calcined Magnesia	C 239-49T	400-3-49
Testing, for Magnesium Oxychloride Cements		400-4-50
Magnesium Chloride Analysis of		400-12-50
Bulk Density of Oxychloride Compositions		300-19-49
Magnesium Sulfate, Analysis of		400-13-50

#### PACKAGING, MARKING AND STORAGE

22. (a) The contractor shall take such measures as may be necessary to insure the safe delivery and storage of all materials used in oxychloride cement compositions on the job, such measures being adequate to avoid damaging moisture pick-up or other contamination from sources existing at the job site.

(b) In addition to other markings, each package shall bear the specific name of the material and, in the case of premixed dry ingredients, the date of mixing.

(c) All dry premixed compositions shall be packaged in suitable containers and kept under adequate conditions to prevent damaging moisture pick-up. When aged longer than sixty days from date of mixing, the composition shall be tested, not more than ten days before using, and shall at the time of testing meet the requirements specified herein.

(d) If requested or if samples are to be tested the contractor shall supply his recommended ratio of gauging solution to dry mix in the terms of gallons of standard gauging solution per 100 lb. of dry mix.

Note 1. - Section 2. - Heavy Duty oxychloride cement flooring possess a wearing hardness greater than that of Tennessee pink marble and is adaptable for service conditions such as institutional and restaurant kitchens, light industrial plants, corridors, lobbies, and business establishments where the floors are subjected to hard usage.

Note 2. - Section 3 (b). - If additives are included to make the composition more water-repellant or water-resistant, or to lend other valuable properties to the composition, they shall be such that the finished floor qualifies in respect to the specified requirements of these specifications and such that the appearance and durability of the floor is not adversely affected.

Note 3. - Section 4 (a). - If any water-soluble ingredient is used other than specified, it shall be added to the gauging solution of full strength, and any such material may be used only if the finished floor fulfills the specified requirements and provided the appearance and durability of the finished installation are not adversely affected.

(OCA-102-50)

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Page 7 of 7 pages

**Tentative Specifications**  
**FOR**  
**NON-SPARK STATIC DISCHARGING OXYCHLORIDE COMPOSITION FLOORING**  
**AND**  
**ITS INSTALLATION**



**OXYCHLORIDE CEMENT ASSOCIATION, INC.**  
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# Tentative Specifications

For

NON-SPARK STATIC DISCHARGING OXYCHLORIDE COMPOSITION FLOORING

AND

ITS INSTALLATION

OCA-103

Revised February 1, 1950

## SCOPE

1. This specification covers the installation of Non-spark Static Discharging Oxychloride Composition Flooring, with respect to the quality of materials and workmanship, installing, finishing, and testing.

## USES

2. Non-spark Static Discharging Oxychloride flooring is designed for use in locations where hazards due to explosives, combustible or explosive gases and dusts, or similar hazards exist, such as in hospital operating rooms, ammunition and chemical plants, petroleum refineries, grain elevators, spray-paint shops, etc. Two-fold protection is afforded against the creation of a spark due to mechanical impact or to the accumulation of static potential. (See Note 1)

## TYPES

3. The flooring shall be furnished in one of the following types, as specified:

Type 1. Trowel Finish

Type 2. Ground Finish

## MATERIALS

4. Dry Mix. (a) The oxychloride composition shall consist of an intimately machine-mixed compound of dry ingredients, which will set to a hard, dense product meeting requirements for electrical conductivity as herein required, when gauged with the solution described in Section 5. The composition shall contain only materials free from substances which are capable of producing a spark when struck or abraded with a steel tool.

(b) All ingredients shall be dry, and shall be accurately proportioned and compounded by weight, mechanically mixed, and shall consist of a finely-ground caustic-calcined magnesia conforming to requirements of Specification OCA Designation 500-10; non-sparking inert fillers, such as talc in quantities not over 3 per cent of the weight of the dry mix, asbestos in quantities not over 5 per cent of the weight of the dry mix, wood flour, and sawdust; non-sparking inert aggregates (which are not affected by cleaning compounds), such as marble flour, fine crushed marble or dolomite, or other chemically inert low-absorbent physically strong aggregates; inorganic colors. All materials used shall be alkali-resistant and free from injurious amounts of deleterious materials such as clay and silt. (See Note 2)

(c) Coarse aggregate and fine chips shall be substantially free from thin, flat, elongated shapes, slivers, and dust.

(d) Fibrous fillers used shall be of such nature that the final finish, under service, will not become fuzzy.

(e) Coarse aggregate shall be uniformly graded from a minimum of 1/8 in. to a maximum which shall not exceed 1/3 of the average thickness of the finished floor.

(f) The use of premixed dry ingredients which have become lumpy shall not be permitted.

5. Gauging Solution. - (a) The gauging solution shall be a water solution of magnesium chloride complying with the requirements of Specification OCA Designation 500-11. The specific gravity of the gauging solution shall be  $23.0 \pm 0.5^\circ$  Baume when tested in accordance with method OCA Designation 350-11. Water used shall be clean and free of deleterious amounts of acids, alkalies, salts, and organic materials. (See Note 3)

(b) Alternate Gauging Solution. - As an alternate for that specified in section 5 (a) a gauging solution containing magnesium sulfate may be used. This shall be a water solution of magnesium chloride and magnesium sulfate complying with the requirements of the Specifications for Magnesium Chloride (OCA Designation 500-11), and the Specifications for Magnesium Sulfate (OCA Designation 500-12), respectively, of the Oxychloride Cement Association. The weight of the magnesium sulfate, calculated as  $MgSO_4 \cdot 7H_2O$ , shall be ten per cent (10%) of the weight of the magnesium chloride, calculated as  $MgCl_2 \cdot 6H_2O$ . The specific gravity of the gauging solution shall be  $24.0 \pm 0.5^\circ$  Baume at 70 F when tested in accordance with method OCA Designation 350-11. Water used shall be clean and free of deleterious amounts of acids, alkalies, salts, and organic materials. (See Note 3)

(c) Solutions shall be prepared sufficiently in advance to permit their being cooled to at least room temperature before using. Care shall be exercised to insure complete solution of all crystalline material and to insure thorough mixing.

6. Strips. - Division strips, base dividers, or ornaments, when required, shall be formed from oxychloride cement, brass, or plastics which are chemically resistant to the cement. All strips shall be such that they will not spark on impact.

7. Certifications of Raw Materials - Contractor shall certify to the architect or owner that the magnesium oxide, magnesium chloride, magnesium sulfate, fillers, and aggregates conform to specifications designated in Sections 4 and 5.

#### PROPORTIONING AND MIXING

8. (a) Composition - The flooring shall be compounded strictly according to a formula used in making the sample(s) approved by and on file with the architect or owner and the composition shall be such as to yield a finished floor essentially the same as or better in appearance than the approved sample(s). Type 1 composition shall contain sufficient filler materials to permit troweling to a highly polished trowel finish. Type 2 composition shall not contain more aggregate than will permit complete filling of voids by the matrix, with a slight excess.

(b) Mixing - The pre-mixed dry ingredients shall be placed in a clean mortar box or a clean mechanical mixer, the required amount of the specified gauging solution added, and the mass mixed until it is free from lumps. Mixing shall be continued for at least five minutes after the last addition of gauging solution. In no case shall the material be retempered for use by addition of gauging solution after it has become too stiff to be applied.

(c) Consistency - The wet mix, prepared as specified in Section 8 (b) shall slump not more than 5 inches when tested in accordance with the method Slump Test for Field Consistency of Oxychloride Cements, OCA Designation 350-12. Sample for test shall be taken immediately after completion of mixing.

#### CONDITIONING OF WORKING AREA

9. In spaces where the floor is to be laid the temperature shall be not less than 50 F and shall not exceed 95 F until final set is attained. The prevailing

temperature shall be maintained substantially uniform in a stipulated range, and shall not decrease more than twenty degrees from the temperature at the time of installation for at least twenty-four hours after placing. Heating shall not be accomplished by the use of salamanders. Convection heating may be employed provided local overheating is avoided, or air not exceeding 70 F may be used in forced circulation providing its velocity at the floor level is not in excess of 500 cu. ft. per min. at any location. Openings shall be kept closed or so arranged as to prevent harmful circulation of air. All water and steam connections from which leaks might affect the oxychloride flooring shall be made tight before placing of the oxychloride coating is begun.

#### PREPARATION OF SUBFLOORS

10. (a) The flooring composition shall be laid on either an oxychloride composition basecoat in accordance with the specifications for Oxychloride Composition Basecoat Type 1 (OCA Designation 100) or a subfloor which has been prepared in accordance with the specifications for Preparation of Subfloors to Receive Oxychloride Composition Flooring (OCA Designation 200). Either Oxychloride Composition Basecoat or other subfloors shall be equipped with a grounding system of such design that the finished floor covered by this specification will meet the detail requirement with respect to resistance set forth in Section 15. The grounding system shall be inspected, tested and approved by the owner immediately before installation of the floor covered by this specification is begun.

(b) Prepared subfloors or basecoats shall be protected from injury and the surface shall be free from any substance deleterious to the formation of a bond, such as water, dust, grease, etc.

#### METHOD OF APPLICATION

11. (a) When the floor is to be laid on an absorptive surface (such as oxychloride composition basecoat, concrete, stone, or ceramic subfloors) this surface shall be thoroughly dampened with gauging solution of full strength, leaving no puddles. The surface shall then be broomed with a thin slurry prepared from gauging solution and either the dry mix or straight caustic-calcined oxychloride magnesia. Areas prepared in this manner must then be covered with the flooring composition as specified in Section 11 (c) before the surfaces set or acquire a glaze.

(b) When the floor is laid on a non-absorptive surface where an anchoring medium is employed, a thin layer of the flooring composition shall be thoroughly worked into and around the anchors. Application of additional flooring composition shall then be made as specified in Section 11 (c) before the surfaces set or acquire a glaze.

(c) Type 1 - Trowel Finish. After preparation of the subfloor surfaces as specified in Section 11 (a) or 11 (b) a thin layer of the flooring composition shall be thoroughly worked into all recesses and depressions by scraping with a trowel immediately prior to spreading the flooring mix. The flooring composition shall then be spread to the specified thickness, leveled by darbying and finished by means of at least two steel trowelings. The final troweling shall be delayed until the composition has acquired sufficient set so that the operation (hard troweling) will produce a smooth floor of uniform color and dense glaze free from laitance.

(d) Type 2 - Ground Finish. The method of application of Type 2 shall be exactly the same as for Type 1 as specified in Section 11 (a), (b) and (c) except as follows: The final steel finish troweling shall not be performed but instead, when the floor has become sufficiently hard, it shall be ground to the desired finish. When wet-grinding is employed the lubricant used shall be the gauging solution of full strength as specified in Section 5.

(e) Oxychloride composition coves and bases and wainscots may be installed integrally with the floor, and the same specifications shall apply as if the mix were laid as flooring.

## THICKNESS

12. (a) The thickness of the non-spark static discharging oxychloride floor at any point shall conform to the following requirements:

	Thickness	
	Not Less Than	Not More Than
On Oxychloride Composition Basecoat	3/8"	3/4"
On Wood Subfloors	5/8"	3/4"
On All Other Subfloors	5/8"	1"

(b) The Oxychloride floor may be installed in one or more coats. If oxychloride is applied as basecoat this basecoat shall conform to the requirements of either these specifications or the Specifications for Oxychloride Basecoat Compositions, OCA Designation 100 (latest revision) of the Oxychloride Cement Association.

## PROTECTION OF FINISHED INSTALLATION

13. (a) After finishing, the floor shall then be covered and protected with sawdust, absorbent paper, or other suitable water-vapor-permeable material until the completion of the work of other trades. Areas used for trucking shall be adequately protected from injury by means of temporary false flooring.

(b) All traffic shall be kept off the finished floor for at least forty-eight hours after the installation has been completed. The finished floor shall not be scrubbed or flooded with water for at least fifteen days after installation is completed.

## PHYSICAL REQUIREMENTS

14. Non-spark Static Discharging Oxychloride Flooring shall conform to the following requirements when tested in accordance with the respective methods listed in Section 21:

(a) Linear Change: 1 to 7 days, shall be within the limits +0.040 to -0.050 per cent.

(b) Transverse Strength: at 7 days, minimum 1500 pounds per square inch.

(c) Compressive Strength: at 7 days, minimum 6000 pounds per square inch.

## ELECTRICAL RESISTANCE

15. Non-spark Static Discharging Oxychloride Flooring shall conform to the following requirements when tested in accordance with the method recommended by the National Fire Protection Association:<sup>1</sup>

(a) The maximum resistance of the floor shall be less than 500,000 ohms as measured between two electrodes placed 3 feet apart at any points on the floor.

(b) The resistance of the floor shall be more than 25,000 ohms, as measured between a ground connection and an electrode placed at any point on the floor, and also as measured between two electrodes placed 3 feet apart at any points on the floor.

1. N.F.P.A. Bulletin No. 56, 1949, page 17, "Recommended Safe Practice for Hospital Operating Rooms", National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

## SPARKING CHARACTERISTICS

16. The floor shall be non-sparking with metal objects, as demonstrated by striking with a motor driven iron flail or an iron brush of not less than 6 in. diameter, rotated at not less than 1000 rpm. in a perfectly dark room.

## WORKMANSHIP

17. The prepared mix shall be laid to the specified thickness in accordance with drawings, by qualified workmen and in conformance with approved procedures, to produce finished surfaces as specified.

## SUPERVISION

18. The flooring contractor shall give his personal supervision to the work or provide a competent forman or superintendent with authority to act for him, who shall be present throughout the entire progress of the installation.

## INSPECTION

19. The architect or owner reserves the right to conduct any inspection or make any test deemed necessary to determine conformance with the requirements of the specifications. Samples approximately 12" x 12" or of other specified size and representative of the finished floor may be requested by the architect or purchaser for selection of the desired color and finish for filing in connection with acceptance inspection.

## SAMPLING

20. (a) The architect or owner reserves the right to take, at the time of or prior to installation, representative composite samples for testing, of materials from each lot offered for delivery, in accordance with Specifications OCA Designation 350-13. The minimum quantities of these samples shall be as follows:

Premixed dry ingredients	20 pounds
Gauging solution	2 gallons
Additives (Notes 2 and 3)	1 pound

(b) Samples thus obtained shall be placed in separate clean, dry, airtight, waterproof containers, securely closed, distinctly labeled and dated. Any tests performed shall be completed within 30 days from date of sampling.

## METHODS OF TEST

21. All methods of test except those specified in Sections 15 and 16 shall conform to those of the Oxychloride Cement Association as follows:

Sieve Analysis of Magnesium Oxychloride Compositions	300-10
Sampling Oxychloride Compositions and Ingredients	350-13
Field Determination of Specific Gravity of Gauging Solution	350-11
Slump Test for Consistency of Magnesium Oxychloride Cements	350-12
Mixing Oxychloride Cement Compositions with Gauging Solution	300-20
Consistency of Magnesium Oxychloride Cements by Means of a Flow Table	300-12
Setting Time of Magnesium Oxychloride Cements	300-15
Transverse Strength of Magnesium Oxychloride Cement Compositions	300-13
Compressive Strength of Magnesium Oxychloride Cement Compositions	300-14
Linear Change of Magnesium Oxychloride Cements	300-16
Magnesia for Magnesium Oxychloride Cements:	
Ignition Loss of Magnesia	400-1
Active Calcium Oxide in Magnesia	400-2
Sieve Analysis of Plastic Calcined Magnesia	400-3
Testing, for Magnesium Oxychloride Cements	400-4
Magnesium Chloride, Analysis of	400-12
Magnesium Sulfate, Analysis of	400-13

## PACKAGING, MARKING AND STORAGE

22. (a) The contractor shall take such measures as may be necessary to insure the safe delivery and storage of all materials used in oxychloride cement compositions on the job, such measures being adequate to avoid damaging moisture pick-up or other contamination from sources existing at the job site.

(b) In addition to other markings, each package shall bear the specific name of the material and, in the case of premixed dry ingredients, the date of mixing.

(c) All dry premixed compositions shall be packaged in suitable containers and kept under adequate conditions to prevent damaging moisture pick-up. When aged longer than sixty days from date of mixing, the composition shall be tested, not more than ten days before using, and shall at the time of testing meet the requirements specified herein.

(d) If requested or if samples are to be tested the flooring contractor shall supply his recommended ratio of gauging solution to dry mix.

- - - - -  
Note 1. (Section 2)-Type 1 Non-spark Static Discharging floors are used where trowel finish is acceptable. Type 2 floors have a modified terrazzo finish and are used where decorative effect is desired. The latter is particularly adaptable to hospital operating rooms and surgical wards where appearance and all other factors incident to cleanliness are of highest importance. It differs from Oxychloride Terrazzo, OCA 105, only in that the fillers and aggregates employed are limited to those which will not spark as a result of mechanical impact and in that its resistance must be within the range specified.

Note 2. (Section 4 (b)) - If additives are included to make the composition more water-repellent or water resistant, or to lend other valuable properties to the composition, they shall be such that the finished floor qualifies in respect to the specified requirements of these specifications and such that the appearance and durability of the floor are not adversely affected.

Note 3. (Section 5 (a)) - If any water-soluble ingredient is used other than specified, it shall be added to the gauging solution of full strength, and any such material may be used only if the finished floor fulfills the specified requirements and provided the appearance and durability of the finished installation are not adversely affected.

(OCA-103)

Page 6 of 6 pages

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Washington 6, D. C.

Tentative Specifications  
FOR  
NON-SLIP OXYCHLORIDE COMPOSITION FLOORING  
AND  
ITS INSTALLATION



OXYCHLORIDE CEMENT ASSOCIATION, INC.  
1028 CONNECTICUT AVENUE  
WASHINGTON 6, D. C.

Tentative Specifications  
for  
NON-SLIP OXYCHLORIDE COMPOSITION FLOORING  
AND  
ITS INSTALLATION

OQA-104

Revised February 1, 1950

SCOPE

1. These specifications cover Non-Slip Oxychloride Composition Flooring, with respect to quality of materials and workmanship, installation, finishing and testing.

TYPES

2. The flooring shall be furnished in one of the following types as specified:

Type 1. General Purpose Non-Slip  
Type 2. Heavy Duty Non-Slip

MATERIALS

3. Dry Mix. - (a) The Oxychloride Composition shall consist of an intimately machine-mixed compound of dry ingredients, which at the time of installation, will set to a hard, dense product, as specified herein, when mixed with the gauging solution specified.

(b) All ingredients shall be dry, and shall be accurately proportioned and compounded by weight, mechanically mixed, and shall consist of a finely-ground caustic-calcined magnesia conforming to requirements of specification OCA Designation 500-10; inert fillers, such as asbestos in proportions not to exceed 5 per cent of the weight of the dry mix, sillex, marble flour, wood flour, and sawdust; inert aggregates (which are not affected by cleaning compounds), such as abrasive aggregate, sand, fine crushed stone, or other chemically inert low-absorbent physically strong aggregates; inorganic colors. All materials used shall be alkali-resistant and free from deleterious materials, such as clay and silt. (See Note 1.)

(c) Additional coarse aggregate for Type 2 shall be supplied separately as specified in Section 7 (b).

(d) All abrasive aggregate shall be non-rusting, shall be either natural (such as emery) or manufactured (such as ceramically-bonded fused alumina) products, the particles of which are of irregular shape or of a slightly open structure necessary to form an effective bond with the cement, and shall be substantially free from thin, flat, elongated shapes, slivers, and dust.

(e) Fibrous aggregate, fine aggregate, filler, and abrasive aggregates shall conform to the following requirements in respect to particle size gradation:

Sieve*	Per Cent Passing				
	Type 1 and Type 2				Type 2
U. S. Number	Wood Flour, Saw-dust and Asbestos	Sand, Fine Crushed Stone, etc. (1)	Sillex, Marble Flour	Fine Abrasive (1)	Coarse Abrasive
6		100		100	100
12					3 max.
20	100				
30				5 max.	
50	80 max.	30 max.			
100		7 max.	100		
200			95 max.		

(1) Well graded in the sieve ranges indicated.

(f) Fibrous fillers shall be of such nature that the final finish, under service, will not become fuzzy.

(g) The use of premixed dry ingredients which have become lumpy shall not be permitted.

4. Gauging Solution. - (a) The gauging solution shall be a water solution of magnesium chloride meeting requirements of OCA Specifications Designation 500-11. The specific gravity of the gauging solution shall be  $22.0 \pm 0.5^\circ$  Baume when tested in accordance with Specification OCA Designation 350-11. Water used shall be clean and free of deleterious amounts of acids, alkalies, salts, or organic materials. (See Note 2)

(b) Alternate Gauging Solution. - As an alternate for that specified in Section 4 (a) a gauging solution containing magnesium sulfate may be used. This shall be a water solution of magnesium chloride and magnesium sulfate complying with the requirements of the Specifications for Magnesium Chloride (OCA Designation 500-11), and the Specifications for Magnesium Sulfate (OCA Designation 500-12), respectively, of the Oxychloride Cement Association. The weight of the Magnesium sulfate, calculated as  $MgSO_4 \cdot 7H_2O$ , shall be ten per cent (10%) of the weight of the magnesium chloride, calculated as  $MgCl_2 \cdot 6H_2O$ . The specific gravity of the gauging solution shall be  $24.0 \pm 0.5^\circ$  Baume at 70 F when tested in accordance with method OCA Designation 350-11. Water used shall be clean and free of deleterious amounts of acids, alkalies, salts, and organic materials. (See Note 2)

(c) Solutions shall be prepared sufficiently in advance to permit their being cooled to at least room temperature before using. Care shall be exercised to insure complete solution of all crystalline material and to insure thorough mixing.

5. Strips. - Division strips, base dividers, or ornaments, when required, shall be formed from brass, stainless steel, monel metal, oxychloride cement, or plastics which are chemically resistant to the cement. If strips of other metals are used, they shall be suitably protected to prevent corrosion.

6. Certification of Raw Materials. - Contractor shall certify to the architect or owner that the magnesium oxide, magnesium chloride, magnesium sulfate, fillers, and aggregates conform to specifications designated in Sections 3 (b), 3 (d), 3 (e), 3 (f), 4 (a) and 4 (b).

#### PROPORTIONING AND MIXING

7. (a) Composition. - The flooring shall be compounded strictly according to the formula used in making the sample or samples approved by and on file with the architect or purchaser and the composition shall be such as to yield a finished floor essentially the same as or better in appearance than the approved samples. Type 1 compositions shall contain fibrous aggregate, fine aggregate and fine abrasive and the minimum amount of filler which will permit trowelling to a smooth trowel finish. The amount of fine abrasive shall be not less than 35% of the total weight of the premixed dry ingredients.

(b) Type 2 composition shall be essentially the same as Type 1. In

addition, coarse abrasive aggregate shall be supplied separately and used as specified in Section 10 (d).

*same 101*  
(c) Mixing. - The dry ingredients shall be placed in a clean mortar box or mechanical mixer, the required amount of the specified gauging solution added, and the mass mixed until it is free from lumps. Mixing shall be continued for at least five minutes after the last addition of gauging solution. In no case shall the material be retempered for use by addition of gauging solution after it has become too stiff to be applied.

(d) Consistency. - The wet mixes <sup>7</sup> of both types, prepared as specified in Section 7 (c), shall slump not more than 5 inches when tested in accordance with Specification OCA Designation 350-12. Sample for test shall be taken immediately after completion of mixing.

#### CONDITIONING OF WORKING AREA

8. In spaces where the floor is to be laid the temperature shall not be less than 50 F. and shall not exceed 95 F. until final set is attained. The prevailing temperature shall be maintained substantially uniform in a stipulated range, and shall not decrease more than twenty degrees from the temperature at the time of installation for at least twenty-four hours after placing. Heating shall not be accomplished by the use of salamanders. Convection heating may be employed, provided local overheating is avoided, or air not exceeding 70 F. may be used in forced circulation providing its velocity at the floor level is not in excess of 500 cu. ft. per min. at any location. Openings are to be kept closed or so arranged as to prevent harmful circulation of air. All water and steam connections from which leaks might affect the oxychloride flooring shall be made tight before placing the plastic mix is begun.

#### PREPARATION OF SUBFLOORS

9. (a) Type 1 flooring compositions shall be laid on either an oxychloride composition basecoat laid in accordance with the specification for Oxychloride Composition Basecoat, Type 1, (OCA Designation 100) or a subfloor which has been prepared in accordance with the specification for Preparation of Subfloors to Receive Oxychloride Composition Flooring (OCA Designation 200).

(b) Type 2 flooring compositions shall be laid on either an oxychloride composition basecoat laid in accordance with the specification for Oxychloride Composition Basecoat, Type 2 (OCA Designation 100) or a subfloor which has been prepared in accordance with the specification for Preparation of Subfloors to Receive Oxychloride Composition Flooring (OCA Designation 200).

(c) Prepared subfloors or basecoats shall be protected from injury and the surface shall be free from any substance deleterious to the formation of a bond, such as water, dust, and grease.

#### METHOD OF APPLICATION *same 1100*

10. (a) When the floor is to be laid on an absorptive surface (such as oxychloride composition basecoat, concrete, ~~stone or ceramic tiles~~) this surface shall be thoroughly dampened with gauging solution at full strength, leaving no puddles. The surface shall then be broomed with a thin slurry prepared from gauging solution and either the dry mix or straight caustic-calcined magnesia. Areas prepared in this manner must then be covered with the flooring composition as

specified in Section 10 (c) or 10 (d) before the surfaces set or acquire a glaze.

(b) When the floor is laid on a non-absorptive surface where an anchoring medium is employed, a thin layer of the flooring composition shall be thoroughly worked into and around the anchors. Application of additional flooring composition shall then be made as specified in Section 10 (c) or 10 (d).

(c) Type 1. - After preparation of the subfloor surfaces as specified in Section 10 (a) or 10 (b) a thin layer of the flooring composition shall be thoroughly worked into all recesses and depressions by scraping with a trowel just prior to spreading the flooring mix. The flooring composition shall then be spread to the specified thickness, leveled by darbying, and finished by means of at least two steel trowelings. The final troweling shall be delayed until the composition has acquired sufficient set so that this operation (hard troweling) will produce a smooth, dense glaze. As soon as practical, the glaze shall be effectively removed, so as to leave the surface of the abrasive aggregate exposed and clean.

(d) Type 2. - After the flooring composition has been applied and leveled by darbying, as described in Section 10 (c), coarse abrasive aggregate shall be sprinkled uniformly on the surface at the rate of not less than four ounces per square foot. This coarse aggregate shall be worked into the surfaces of the freshly laid composition only enough to permit trowel finishing. Thereafter, troweling and finishing shall be as described in Section 10 (c).

#### THICKNESS

11. The thickness of either type over all subfloors shall be not less than 5/8" nor more than 3/4" at any point.

#### SEALING

12. (a) The floor shall be thoroughly cleaned after final set so that it is free from all foreign materials, laitance, etc., and shall be sealed as prescribed in Section 12 (b) with a sealer of low viscosity and which will maintain a low viscosity after at least 30 minutes' exposure in the form of a thin film to a normal atmosphere at a temperature of 80 F. Such sealers shall impart a uniformly water-repellent or water-impervious character to the surface of finished floor. The sealer shall be similar or equivalent to that formed from a low viscosity, slow evaporating solvent, a microcrystalline paraffin wax, and china wood oil.

(b) The floor surface shall be wet with an excess of the penetrating sealer for at least 30 minutes, after which the excess sealer shall be removed from the surface by means of rags or mop, or by means of sawdust spread over the floor surface to absorb the excess sealer and then completely removed by sweeping. The floor surface shall be free from any substantial surface coating after removal of the excess sealer.

#### PROTECTION OF FINISHED INSTALLATION

13. (a) The floor, after sealing, shall be covered and protected with sawdust, absorbent paper, or other suitable water-vapor-permeable material until the completion of the work of other trades. Areas used for trucking shall be adequately protected from injury by means of temporary false flooring.

(b) All traffic shall be kept off the finished floor for at least forty-eight hours after the installation is completed. The finished floor shall not be scrubbed or flooded with water for at least fifteen days after installation is completed.

#### PHYSICAL REQUIREMENTS

14. Non-Slip Oxychloride Compositions shall conform to the following physical requirements when tested (with coarse abrasive omitted) in accordance with methods listed in Section 19.

(a) Linear Change, 1 to 7 days, shall be within the limits +0.040 to -0.050 per cent.

(b) Transverse Strength at 7 days, minimum 1600 pounds per square inch.

(c) Compressive Strength at 7 days, minimum ~~6000~~<sup>5000</sup> pounds per square inch.

#### WORKMANSHIP

15. The prepared mix shall be laid to the specified thickness, in accordance with drawing details, by qualified workmen, producing the finished surfaces as specified.

#### SUPERVISION

16. The contractor shall give his personal supervision to the work or provide a competent foreman or superintendent with authority to act for him, who shall be present throughout the entire progress of the installation.

#### INSPECTION

17. The architect or owner may reserve the right to conduct any inspection or make any test deemed necessary to determine conformance with the requirements of these specifications. Samples approximately 12" x 12" or of other specified size, representative of the finished floor may be requested by the architect or owner for selection of the desired color and finish and for filing in connection with acceptance inspection.

#### SAMPLING

18. (a) The architect or owner reserves the right to take, at the time of or prior to installation, representative composite samples, for testing, of materials from each lot offered for delivery, in accordance with Specification OCA Designation 350-13. The minimum quantities of these samples shall be as follows:

Premixed dry ingredients	20 pounds
Gauging solution	2 gallons
Additives (Notes 1 and 2)	1 pound

(b) Samples thus obtained shall be placed in separate clean, dry, air tight, waterproof containers, securely closed, distinctly labeled and dated. Any tests performed shall be completed within 30 days from date of sampling.

#### METHODS OF TEST

19. All methods of test shall be in accordance with the Manual of Standard

Testing Procedures of the Oxychloride Cement Association according to the following OCA designations:

Sieve Analysis of Magnesium Oxychloride Compositions	300-10
Sampling Oxychloride Compositions and Ingredients	350-13
Field Determination of Specific Gravity of Gauging Solution	350-11
Slump Test for Consistency of Magnesium Oxychloride Cements	350-12
Mixing Oxychloride Cement Compositions with Gauging Solution	300-20
Consistency of Magnesium Oxychloride Cements by Means of a Flow Table	300-12
Setting Time of Magnesium Oxychloride Cements	300-15
Transverse Strength of Magnesium Oxychloride Cement Compositions	300-13
Compressive Strength of Magnesium Oxychloride Cement Compositions	300-14
Linear Change of Magnesium Oxychloride Cements	300-16
Magnesia for Magnesium Oxychloride Cements:	
Ignition Loss of Magnesia	400-1
Active Calcium Oxide in Magnesia	400-2
Sieve Analysis of Plastic Calcined Magnesia	400-3
Testing, for Magnesium Oxychloride Cements	400-4
Magnesium Chloride, Analysis of	400-12
Bulk Density of Oxychloride Compositions	300-19
Magnesium Sulfate, Analysis of	400-13

#### PACKAGING, MARKING AND STORAGE

20. (a) The contractor shall take such measures as may be necessary to insure the safe delivery and storage of all materials used on the job, such measures being adequate to avoid damaging moisture pick-up or other contamination from sources existing at the job site.

(b) In addition to other markings, each package shall bear the specific name of the material and, in the case of premixed dry ingredients, the date of mixing.

(c) All dry premixed compositions shall be packaged in suitable containers and kept under adequate conditions to prevent damaging moisture pick-up. When aged longer than sixty days from date of mixing, the composition shall be tested, not more than ten days before using, and shall at the time of testing meet the requirements specified herein.

(d) If requested or if samples are to be tested the contractor shall supply his recommended ratio of gauging solution to dry mix.

Note 1. Additives intended to make the composition water-repellent or water-resistant, or to lend valuable properties to the composition, may be added to the dry ingredients provided the finished flooring meets specified requirements.

Note 2. If any water soluble ingredient other than specified is used in the gauging solution, it shall be added to the full strength gauging solution, and such material may be used only if the finished floor meets specified requirements and provided the appearance and durability of the finished installation are not adversely affected.