



Barnet Holmes

DINSDALE COURT REAR STAIRS

Structural Performance Specification





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1 INTRODUCTION

WSP have been appointed to provide a structural performance specification for the full replacement of 3No. External Steel staircases at the rear of Dinsdale Court, Barnet. The contractor is to complete the final design of all elements regarding the steel staircase, including the structural members and connections, walkway plates, stair treads and balustrades. The staircases provide access at each level for the 3-storey apartment building which is split into 3 blocks.



Figure 1-1 - Aerial View of Dinsdale Court

Many of the staircase elements have experienced significant corrosion, cracking and various other defects which has led to the replacement of the staircases. WSP Structural Survey Report (BH-WSP-XX-RP-S-0001) that was conducted in September 2019, highlights the defects found onsite and analyses the structural integrity of the existing staircases in their current condition.

The Staircases appear to have identical construction from above Ground Floor Level with differing foundation details. For Staircases 2 & 3, a raised concrete base forms the foundation at Ground Floor Level. Whereas for Staircase 1, a half landing is supported off the garage roof at Ground Floor Level with the columns extending down to Lower Ground Level. As the existing foundation arrangements have not been exposed the current extent and detail of the substructure is not known.

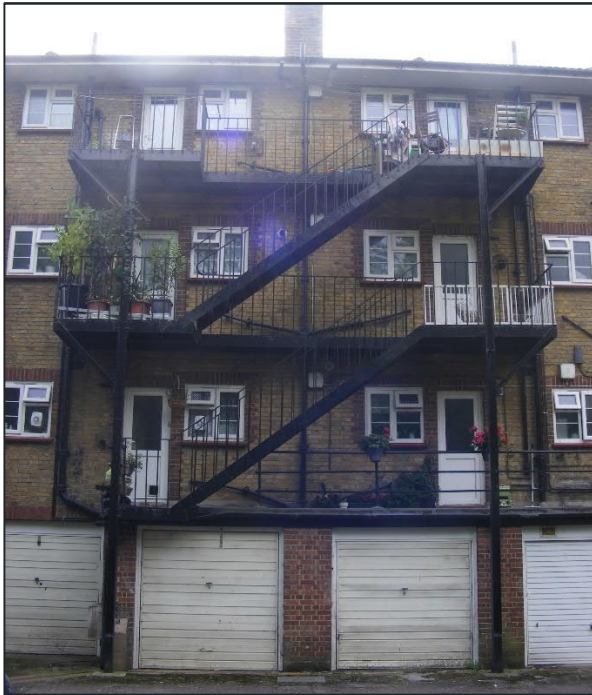


Figure 1-2 - Photo of Existing Staircase 1 - Garage Stairs



Figure 1-3 - Photo of Existing Staircase 2 - Middle Stairs (Staircase 3 Similar)

2 PROPOSED WORKS

A summary of the proposed works to be completed by the contractor for the replacement of the 3No. Steel Staircases at Dinsdale Court is outlined below:

- Demolition of existing staircases.
- Expose existing foundations to assess condition and adequacy for re-use for new staircase.
- Complete final design of new staircases suiting the requirements in this Structural Performance Specification.
- Erect new steel structural elements with similar geometry to the existing staircases.
- Create pockets in existing brickwork cladding for installation of new steelwork elements onto the load bearing inner leaf.

2.1 DEMOLITION OF EXISTING STAIRCASE

The existing steel staircase is to be demolished prior to the erection of the new steel staircases. Particular care will be required when removing existing elements embedded into the external face of the apartment building as to not damage the brickwork. It is unknown the embedment depth of the existing steel plates into the brickwork, however it is likely to extend onto the load-bearing inner leaf. The existing external wall construction is to be determined on site by the contractor to confirm/design the final connection detail back to the existing structure. In many locations, existing services surround the areas where the steel plates protrude from the Brickwork. Care must be taken to not damage the existing live services which may require temporary diversion to allow access.



Figure 2-1 - Photos of Existing Steel Plates Embedded into Existing Brickwork Facade



For Staircase 1, the half landing at Ground Floor Level appears to be supported by the garage roof. The nature of this support is unknown, therefore the contractor is required to expose the existing arrangement to confirm/design the final connection detail back to the existing structure that is required. Further care is required in this location as to not damage the existing garage roof when removing both the half landing and stair stringer.



Figure 2-2 - Photos of Existing Staircase 1 Half Landing

2.2 EXPOSE EXISTING FOUNDATION

The existing foundations are required to be exposed to review details and condition. It is expected that the existing foundation will be adequate to re-use for the new staircases, however following review by the engineer and contractor, should the existing foundations be deemed unsuitable new pad foundations will be required.

For staircases 2 & 3 the columns are supported on a raised concrete section for which exposing the foundations for review may be difficult.

2.3 NEW STEEL STAIRCASES

The new staircase is to be constructed to match the existing general arrangement as far as possible, ensuring all regulatory requirements (for example, Eurocodes and Building Regulations) are met.

The arrangements given in this performance specification are considered to be an illustrative design. The final design of all steelwork, including primary members, stair treads, walkway panels, perimeter balustrading and all connections will be to the contractor's final design suiting all requirements given in this performance specification,

In general, we anticipate the staircase landings will consist of Steel Channels (PFCs) and Angles (RSAs) that support open grid mesh walkway plates. Staircases themselves are anticipated to be formed of PFC stringers supporting steel treads. A balustrade is required to the entirety of the landings and staircases.

At each floor level, several PFC landing beams are to protrude through the external brickwork face of the existing building and supported by the load bearing inner leaf. This approach is to be based on the existing support arrangement; details of the existing external wall build-up are to be confirmed by the contractor during demolition of the existing stair. Matching the existing arrangement, 2No. Universal Column sections are expected to provide vertical support at each level down to ground.

3 DESIGN PARAMETERS

3.1 DESIGN STANDARDS

All structures shall be designed to European and British Standards. Alternative standards may be proposed if it can be satisfactorily demonstrated that they are equivalent, in all respects, to the above mentioned standards. The design will be in accordance with the following codes and standards:

- EN 1990:2002 Basis of structural design
- EN 1991-1:2002 Actions on structures.
- EN 1993-1:2005 Design of Steel Structures
- EN 1996-1:2005 Design of Masonry Structures
- Building Regulations

Where two or more standards apply to the same issue, or conflicts arise between codes or standards, the more stringent shall apply. The contractor is responsible for ensuring the final design meets all relevant and statutory requirements including access requirements and slip resistance.

3.2 DESIGN LIFE

The design of all permanent structures will be designed and detailed to comply with the employer's requirements for a minimum design life of 50 years (BS EN 1990).

3.3 FIRE PROTECTION

Structural steelwork where required is to be protected for 60 minutes fire resistance.

3.4 MATERIALS

3.4.1. Structural Steelwork

Principle members:	Grade S355
Yield strength p_y :	355N/mm ² up to 15mm thick
Modulus of Elasticity:	210kN/mm ²

3.4.2. Existing Masonry (Loadbearing Inner Leaf)

Blockwork Density:	1600kg/m ³ (typical)
Strength:	7.3N/mm ²
Thermal expansion:	10 x10 ⁻⁶ /°C

3.4.3. Existing Masonry (Non-Loadbearing External Leaf)

Brickwork Density:	1960kg/m ³
Minimum strength:	27N/mm ²
Water absorption:	>12%
Thermal Expansion:	5 x10 ⁻⁶ /°C

Note: Any external masonry that is removed is to be made good to match the existing appearance.

3.5 ENVIROMENT CONDITIONS/EXPOSURE CRITERIA

The Steelwork Staircase will be classed as C3 (medium), as this is an external urban area.

3.6 DEFLECTION AND MOVEMENT

3.6.1. Vertical deflections

The design should be carried out such that the deflections are within the limits imposed by the relevant design codes (BS EN 1993-1-1) unless noted otherwise.

A. Edge Beam Deflection

Live load deflection limit of span / 500 or 15mm whichever is the smaller.

B. Typical Beam Deflection

Internal beams - Live load deflection limit of span / 360.

Cantilever beams - Live load deflection limit of span / 180.

[Max Deflection under all loads is limited to 25mm on typical Floors)

3.6.2. Horizontal Deflection

Horizontal deflections due to wind and imposed loads are limited to the appropriate figures in the design codes applied, unless specified otherwise by the Client.

The general parameters adopted are:

Steel Frames (BS EN 1993-1-1): Storey Height/300

3.7 DESIGN LOADS

The following loads should apply to the design of the new staircase:

DESCRIPTION	BREAKDOWN	UDL (kN/m ²)	UDL (kN/m)
Fire escape external staircase	Dead Loads		
	Steel Open Mesh Flooring	0.50	
	S/W of Steelwork	0.50	
	Balustrade		1.0
	Imposed Loads		
	Circulation	4.0	
	Balustrade (horizontal)		1.1

Note: 1. Imposed loads from BS EN 1991-1-1 unless specified otherwise.

4 G10 STRUCTURAL STEEL FRAMING SPECIFICATION

To be read with Preliminaries/ General conditions.

NB: References to the “CA” shall be taken to mean an appropriate person designated by the Main Contractor.

GENERAL REQUIREMENTS/ INFORMATION

105 STEELWORK FABRICATOR

The steelwork fabricator must be a member of the BCSA, CE marking accredited or a member of another comparably nationally accredited organisation.

107 EXECUTION CLASS

The requirements of EXC2 to BS EN 1090-2 shall apply unless noted below, where the requirements of EXC3 apply:

- No EXC3 currently required.

109 RESPONSIBLE SOURCING

All structural steel should be sourced from a BES6001 or EMS certified supplier.

The certification shall be: Very Good.

110 DESIGN

Design standard: The final design of the structural steelwork is to be completed by the contractor in accordance to the relevant regulatory requirements.

Recommended Steel grades: Generally S355.

Completion of design: Final design and detail by the contractor.

Loading requirements: As specified or otherwise calculable from the information given.

Design parameters: As recommended in this Performance Specification.

115 DESIGN CONSTRAINTS

Members forming bracing systems or girders of lattice construction: Position so that their lines of action intersect at a point.

Bolts:

Grade: 8.8

Diameter (minimum): 12mm

Number per connection (minimum): not less than two bolts

Welds: to be at least 6mm fillet welds.

117 SIMPLE BEAM CONNECTIONS

Unless noted otherwise, all steel beam connections are to be details as “simple” connections in accordance with SCI P358 (The Eurocode 3 Green Book).

118 BACK-TO-BACK CONNECTIONS THROUGH WEBS

Where two beams have a back-to-back connection through the web of a column or beam, detail the connection so that minimum one bolt (two for beams more than 500 mm deep or 12 m long) can be inserted and tightened to support the first beam while the second beam is erected.

These connections can be through the column web or through a seating cleat (if permitted). Either identify which beam has to be erected first or detail the connection so that either can be erected first.

120 DRAWINGS AND CALCULATIONS

Requirement: Before preparing detailed fabrication drawings, submit:

- General arrangement drawings with individual steel members clearly identified.
- Calculations for all structural elements and major connections.

125 SPECIFICATION STANDARD

Standard: Comply with latest edition (CE marking) of National Structural Steelwork Specification (NSSS).

Document availability: Make available during the course of the Works at fabrication shop and on site.

132 GENERAL STEEL SECTIONS AND PLATES

Standard: To BS EN 10025-2

Grade: S355 J2

- Options: Steel to be blast cleaned and galvanized to 85 microns thickness and prepared to receive a finish paint system, to meet corrosion category C3.

Source: Obtain steel from a source accredited to a national or internationally accepted quality standard.

Other requirements: Provide product analysis for steel that is to be galvanised.

FABRICATION

180 NOTIFICATION OF COMMENCEMENT

Give notice: Before fabrication is due to start.

Period of notice (minimum): 5 working days.

185 STEEL QUALITY

Provide the CA with details of the source of all steelwork and ensure that it has been tested in accordance with the appropriate material quality standard.

190 MARKING

Identifying and recording materials and components: Submit details of proposed methods.

Location of marks:

- Generally: Visible for checking after erection.
- Weathering steel: On surfaces not exposed to open view in the completed work.

Steel to be blast cleaned, pickled, metal sprayed or galvanized: Marked so that subsequent treatment cannot obliterate the marking.

225 STEELWORK TO BE GALVANISED

Cutting, drilling and shop welding: Complete before galvanizing.

Vent and drain holes: Provide as necessary.

- Locations: Submit proposals.
- Sealing: Not permitted.

WELDING

255 SITE WELDING

Usage: Site welding prohibited

BOLT ASSEMBLIES

302 NON-PRELOADED BOLT ASSEMBLIES

Designation: Hexagon head bolts to BS EN ISO 4014, grade B.

- Threading: To suit design criteria

Nuts and washers: To suit grade of bolt, as NSSS CE Marking version, clause 2.4.3.

Coating applied by manufacturer: Galvanized.

Other requirements: Provide additional washers under the nut as necessary.

306 CHEMICAL ANCHORS:

Manufacturer and reference: Hilti, or equivalent.

Spacing and distance to edge of concrete or masonry for expanded bolts and chemical anchors to comply with fixing manufacturer's recommendations for maximum safe static load.

370 GALVANIZED COATING TO BOLT ASSEMBLIES

Standard: To BS 7371-6.

Galvanizing: Applied by fastener manufacturer. Passivated and lubricated if no additional coatings are specified. Nuts tapped after galvanizing.

Use/ location: All

ERECTION

410 PRE-ERECTION CHECKS

Scope: At least 7 days before proposed erection start date, check the following:

- Foundations and other structures to which steelwork will be attached: Accuracy of setting out.

Inaccuracies and defects: Report without delay.

Obtain permission to commence erection.

415 ERECTING STEELWORK:

The Contractor will be responsible for accurately positioning, levelling and plumbing all steelwork in accordance with the drawings. All stanchion bases, beam and girder bearings etc. are to be securely supported on suitable steel packs.

425 MODIFICATIONS

Steelwork: Do not modify without approval.

435 BEAMS GENERALLY

Where two beams have a back-to-back connection to the web of a column or beam, insert and tighten minimum one bolt (two for beams more than 500mm deep or 12m long) to support the first beam, while the second beam is erected.

440 COLUMN BASES

Levels: Adjust using steel shims or folding wedges no larger than necessary.

Location of shims/ wedges: Position symmetrically around perimeter of base plate. Do not use a single central pack.

Give notice: If space beneath any column base is less than, or over 25 mm greater than, the specified dimension.

Accuracy of erection: Check, and correct errors before filling and bedding beneath bases and carrying out other adjacent work.

442 FINE CONCRETE FILLING/ BEDDING OF COLUMN BASES

Bolt pockets: Completely filled with proprietary non shrink grout.

Spaces beneath base plates: Completely filled as follows:

Spaces 25-50 mm deep: proprietary non shrink grout, just fluid enough to pour. Tamped well as filling proceeds. Provide temporary shuttering as necessary.

Spaces 50-80 mm deep: 1:2 cement:sand mortar, just damp, tamped well against properly fixed supports as filling proceeds.

Cement: Portland cement BS EN 197-1 - CEM I 42.5 or 52.5.

Sand: To BS EN 12620.

TESTING

460 INSPECTION:

Permit an independent inspection authority, to inspect the work at all reasonable times and at all places where it is being carried out. Provide all facilities, hand tools, lighting, etc. as necessary to ensure adequate inspection.

465 TESTING:

Arrange for the following testing to be carried out. Prepare any necessary test pieces. Submit 2 copies of all test and examination results immediately they are available.

TYPE OF TEST

TEST/EXAMINATION	STANDARD
Visual Inspection	BS EN 970
Magnetic particle testing	BS6072 and BS EN ISO 9934-1
Ultrasonic examination	BS EN 1714 and BS3923: Part 2

SCHEDULE OF TEST REQUIREMENTS

WELD LOCATION/TYPE	GRADE OF STEEL	TEST/INSPECTION	EXTENT
Butt Welds	All	Ultra sonic	20%
		Visual	100%
Fillet welds	All	Magnetic particle test	10%
		Visual	100%

470 TESTING AUTHORITY:

All tests to be carried out by NAMAS accredited laboratory.

475 PRODUCTS:

When requested submit a copy of test certificates for steel.

480 DEFECTIVE WORK:

As soon as possible after any part of the work or any materials are known or suspected to be defective, submit proposals for further testing, inspection or replacement and obtain instructions.

GENERAL REQUIREMENTS FOR PROTECTIVE COATING WORK

515 OPERATIVES

Must be appropriately skilled and experienced in the use of specified materials and methods of application.

520 COATING MATERIALS:

Wherever possible, to be from one manufacturing batch. Where more than one batch is to be used, keep separate, allocate to distinct parts or areas of the work, and inform accordingly.

Check that all coating materials to be used are recommended by their manufacturers for the particular surface and conditions of exposure, and that they are compatible with each other.

535 INSPECTION OF COATING WORK:

Work in progress: Permit coating manufacturer to inspect and take samples of products.

Notice: Give notice dates for:

- Start of surface preparation and coating.
- Coated members or components leaving the works.
- Period of notice (minimum): 5 working days.

540 HANDLING AND STORING COATED STEELWORK:

Use methods and equipment which will minimise chafing, chipping and other damage to coated components.

Ensure an adequate drying/curing period for each coat before handling.

Use suitable packings, lashings, lifting harnesses, nylon slings, rubber protected chains and chocks, etc.

Stack coated components clear of the ground, separated by timber chocks, and so that ponding does not occur.

545 PROTECTION:

Protect freshly applied surface coatings from damage.

Exhibit 'Wet paint' signs and provide protective barriers where necessary.

Protect surfaces adjacent to those being covered.

549 REMEDIAL WORK:

Early degradation of coatings by blistering, peeling, flaking, cracking, lack of adhesion, etc. must be made good by complete removal, preparation and reapplication of all coats, as instructed.

Inadequate dry film thickness or surface defects due to adverse weather may, depending on the type of paint, be remedied by rubbing down and applying further coat(s), as instructed.

Mechanical damage to coatings must be made good by local cutting back of coatings, preparation and reapplication of all coats to leave a neat, continuous and flat finish.

Where damage to coatings or subsequent surface preparation has exposed bare metal, it must be thoroughly cleaned and primed within two hours.

550 POST-GALVANIZING INSPECTION

Inspector: Submit, on request, evidence of training and competence in visual inspection for liquid metal assisted cracking.

Components for which visual inspection is not required (procedure PGI-0): Not applicable.

Components requiring additional inspection:

- Procedure PGI-2A: None.
- Procedure PGI-2B: None.

Timing: Before erection of steelwork or application of other coatings.

Action in event of non-compliance:

- Submit: Full records of all post-galvanising inspections, drawing attention to any erected components that are required to be quarantined.
- Procedure PGI-3: Carry out on all quarantined components, and submit report.
- Sites of suspected defects: Remove zinc coating by grinding back to bright metal for a distance of not less than 50 mm around each defect and from a similar area on opposite face of member and inspect.
- Remedial actions: Submit proposals.

PROTECTIVE COATING SYSTEM(S)

610 GALVANIZING:

Use/location: All external steelwork.

Preparation: Acid pickling

Galvanizing: To BS EN ISO 1461, minimum average coating thickness 85 micrometres.

643 PROTECTIVE PAINTING TO EXTERNAL STEELWORK

Paint manufacturer: Contractor to submit proposals.

Shop preparation: Blast clean as BS EN ISO 8501-1:2001, preparation grade SA2½, Galvanize and Mordant Wash.

Shop primer: Epoxy Primer.

- Primer Dry film thickness: 40 microns.

Shop intermediate coat: High build epoxy MIO.

- Intermediate coat thickness: 100 microns.

Site applied Finish coat: Re-coatable polyurethane finish.

- Finish coat thickness: 60 microns

Corrosion protection:

- Standard: To BS EN ISO 12944-1.
- Corrosivity Category: C3
- Durability Range: High

System Number: Contractor to submit proposals.

Other requirements:

- Colour as required by client or to match existing.
- Concealed elements; access to these elements is restricted for lifetime of building.

650 BLACK BITUMEN AS CLAUSE 850

- Use/location: Steelwork in contact with concrete below ground, or in cavity walls.
- Site preparation: Manual wash-down
- Shop primer: DF
- Dry film thickness: 50 microns

PREPARATION FOR PAINTING

710 OFFSITE PREPARATION AND PAINTING

Working area: Covered and properly lit, heated and ventilated.

Sequence of working: Select from the following and submit proposals:

- Fabricate, blast clean, prime.
- Blast clean, fabricate, remove flash rust with a light overall sweep blast, prime.
- Blast clean, apply weldable prefabrication primer, fabricate, prime.

Prefabrication primer (option 3): Type recommended by manufacturer of post fabrication primer.

Thickness of post fabrication primer coat: May be reduced if and as recommended by manufacturer.

Surfaces inaccessible after assembly: Apply full treatment and coating system including, if necessary, local application of site coatings.

720 BLAST CLEANING

Ensure that steel complies with Sa 2.5 (ISO 8501-1 2007) at time of blasting as follows.

- Dry blasting: Initial rust grade A or B.

Blast clean to the specified Sa 2.5 preparation grades. Use abrasive of suitable type and size, free from contamination by fines, water and oil. Remove abrasive residues.

Remove all surface defects likely to be detrimental to the protective painting system, including:

- Defects in the steel, including cracks, surface laminations, shelling and deep pitting as required by BS 4360.
- Defects resulting from fabrication, including fins at cuts, burrs, sharp edges and weld spatter.

Apply primer as soon as practicable and while the surface is still in a condition acceptable to International Protective Coatings.

730 PREPARATION FOR SITE WELDING OF SHOP PAINTED STEELWORK

Method: Select from the following:

Mask weld areas immediately after blast cleaning and before coating steelwork. If paint system comprises more than one coat, step each coat 30 mm back from edge of preceding coat and away from masked areas. Remove masking immediately before welding.

Prepare and paint steelwork including weld areas. Grind off to bare steel around each weld area immediately before welding.

735 TREATMENT OF SITE WELDED JOINTS IN PAINTED STEELWORK

Preparation: After welding, and without delay, remove scale and weld spatter from weld areas. Remove traces of rust. Wash with clean water and allow to dry. Prime without delay.

Protective/ Decorative coatings: Apply to weld areas to match surrounding painted areas.

736 TREATMENT OF SITE WELDED JOINTS IN GALVANIZED STEELWORK

Preparation: After welding, and without delay, remove scale and weld spatter from weld areas. Remove traces of rust. Wash with clean water and allow to dry.

Coating: Reinstate using one of the methods given in BS EN ISO 1461, clause 6.3.

740 BOLTED JOINTS (OTHER THAN FRICTION GRIP JOINTS)

Steelwork to be shop painted: Apply full shop specification to joint faces.

Steelwork to be erected with mill finish then site painted: Before erection, prepare and prime joint faces and allow to dry.

Bolted joints in externally exposed steelwork:

Immediately before assembling, apply a further coat of primer and bring surfaces together while still wet.

After assembling and before applying site coatings, seal crevices to bolts and joint perimeters with a compatible sealant.

755 UNCOATED FASTENERS

Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Without delay, coat to match adjacent shop painted areas.

760 GALVANIZED FASTENERS

Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Etch prime.

765 SITE PREPARATION OF SHOP PAINTED STEELWORK

Preparation: Before coating, abrade or wash down or both, as recommended by paint manufacturer.

770 SITE PREPARATION OF GALVANIZED SURFACES FOR PAINTING

Preparation: Thoroughly degrease. Remove white corrosion products. Wash off and allow to dry before applying etching wash or primer.

PAINTING

810 ENVIRONMENTAL CONDITIONS

General requirements prior to starting coating work:

Surfaces: Unaffected by moisture or frost.

Steel temperature: At least 3°C above dew point, with conditions stable or improving, and not high enough to cause blistering or wrinkling of the coating.

Relative humidity: Below 85%.

815 COATINGS

Surfaces to be coated: Clean, dust free and suitably dry. Previous coats to be adequately cured.

Multiple coats of same material: Use different tints to assist checking of complete coverage.

Penultimate coat: Colour recommended by paint manufacturer to suit top coat colour.

Finish required: Smooth and even, of uniform thickness and colour, free from defects.

820 FILM THICKNESS

Wet film thickness: During application, check thickness of each coat with a wheel or comb gauge used in accordance with BS EN ISO 2808.

Accumulated dry film thickness: After each coat has dried, check total accumulated film thickness.

- Method: Magnetic or electromagnetic meter.
- Number and position of measurements: As directed.
- Validation: Measurements to be independently witnessed.
- Meter calibration: Check against standard shims and recalibrate regularly against a smooth steel reference plate.

Average dry film thickness:

- At least specified thickness over any square metre.
- No reading to be less than 75% of specified thickness.

Top coat dry film thickness: Sufficient to give an even, solid, opaque appearance.

825 STRIPE COAT

External angles, nuts, bolt heads, rough weld seams, and areas difficult to coat: Apply an additional stripe coat of primer and undercoat.



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