

INCH-POUND

MIL-DTL-29229B(YD)

14 March 1997

SUPERSEDING

MIL-S-29229A(YD)

12 February 1990

DETAIL SPECIFICATION

SWITCHES AND FROGS, TRACK, FABRICATED, FOR PORTAL CRANES

This specification is approved for use by the Naval Facilities Engineering Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This document covers special fabricated track switches and frogs for portal crane tracks.

1.2 Classification. Portal crane track fittings will be of the following types, classes, and styles as specified (see 6.2):

Type I - Double tongue track switches.

Class A - Curve to right.

Class B - Curve to left.

Type II - Rigid frogs.

Class C - Double/double flangeway, for intersection of 135CR with 135CR.

Class D - Double/single flangeway.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: Commanding Officer (Code 1581), Naval Construction Battalion Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 2250

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

MIL-DTL-29229B(YD)

Style 1 - for intersection of 135CR with 115RE (Nonramped).

Style 2 - for intersection of 135CR with 115RE (Ramped).

Type III - Half-crossing.

Class E - Combination of two class D, style 1 frogs.

Class F - Combination of two class D, style 2 frogs.

Class G - Combination of a class C frog with a class D, style 1 frog.

Class H - Combination of a class C frog with a class D, style 2 frog.

Type IV - Turntable frog.

2. APPLICABLE DOCUMENTS

2.1 Other Government documents, drawings, and publications. The following other Government drawings form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

1403331 - Fabricated Portal Crane Track Frog, for Intersection of 135CR with 115RE (Nonramped).

1404035 - Fabricated Portal Crane Track Switch Assembly.

1404036 - Fabricated Portal Crane Track Switch, Switch Base and Switch Rail.

1404037 - Fabricated Portal Crane Track Switch, Cross Sections.

1404038 - Fabricated Portal Crane Track Frog, for Intersection of 135CR with 135CR.

1404039 - Fabricated Portal Crane Track Frog, for Intersection of 135CR with 115RE (Ramped).

1404040 - Fabricated Portal Crane Track Turntable Frog, Plan and Assembly.

1404041 - Fabricated Portal Crane Track Turntable Frog, Cross Sections.

(Copies of federal and military specifications, standards, handbooks, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

MIL-DTL-29229B(YD)

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

- ANSI B18.2.1 - Square and Hex Bolts and Screws, Inch Series, Including Hex Cap Screws and Lag Screws.
- ANSI B46.1 - Surface Texture.
- ANSI Y14.36 - Surface Texture Symbols.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA Manual for Railway Engineering.

(Application for copies should be addressed to the American Railway Engineering Association, 2000 L Street, N.W., Washington DC 20036.)

ASTM

- ASTM A 1 - Carbon Steel Tee Rails.
- ASTM A 36 - Structural Steel.
- ASTM A 108 - Steel Bars, Carbon, Cold Finished, Standard Quality.
- ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- ASTM A 514 - High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
- ASTM A 576 - Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
- ASTM A 786 - Rolled Steel Floor Plates.

(Application for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 - Structural Welding Code.

(Application for copies should be addressed to the American Welding Society, 550 N.W. Le Jeune Rd., Miami FL 33126.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

MIL-DTL-29229B(YD)

3. REQUIREMENTS

3.1 Description. Track fittings shall be as specified herein and shown on NAVFAC drawings 1403331 and 1404035 through 1404041. The equipment specified herein are specially designed items intended for specific application to portal crane tracks. Examples of various applications of equipment covered by this document are shown in figure 1.

3.1.1 Double tongue track switch. The double tongue switch consists of a fabricated steel switch bed supporting a fabricated steel switch tongue with two rails. These provide a flangeway on both the gage side and the field side of the running rails, in either operating position. The switch tongue shall be curved for turnout to the right for class A, or to the left for class B (see 1.2). The double tongue switch shall be constructed to provide adequate drainage to prevent ponding of rainwater. Additional options for track switches are listed in table I and depicted on NAVFAC drawings 1404035 and 1404037.

TABLE I. Options for double tongue track switch (see 6.2).

Option Number	Choose one	Choose one	Description
1	A	a	With stub rails. Field rails bolted to stub rails (see figure 2).
		b	Field rails welded to stub rails (see figure 3).
	B	a	Without stub rails. Field rails connected to switch base plate using rail clips (see figure 4).
		b	Field rails welded to switch base plate (see figure 5).
2	A		Cover plates bolted in place.
	B		Cover plates hinged to switch.

3.1.2 Rigid frogs. The rigid frogs are fabricated as shown in NAVFAC drawings 1403331, 1404038, and 1404039. Class A is designed with two double flangeways for the intersection of two crane rails. Class B is designed with a double flangeway for one rail and a single flangeway for the other. This accommodates the intersection of a crane rail with a standard gage railroad rail. Additional options for rigid frogs are listed in table II and depicted on applicable drawings.

3.1.3 Half-crossing. The half-crossing shall be class E, F, G, or H as specified (see 1.2 and 6.1.2). Half-crossings are shown on NAVFAC drawings 1403331, 1404038, and 1404039. Examples of half-crossing configurations are shown in figure 1. Options listed in table II apply to the frogs used to construct a half-crossing.

MIL-DTL-29229B(YD)

TABLE II. Options for rigid frogs (see 6.2).

Option Number	Choose one	Choose one	Description
1	A	a	With stub rails. Field rails bolted to stub rails (see figure 2).
		b	Field rails welded to stub rails (see figure 3).
	B	a	Without stub rails. Field rails connected to switch base plate using rail clips (see figure 4).
		b	Field rails welded to switch base plate (see figure 5).
2			Specify angle of track intersection.
3			If application requires a radius frog, specify the radius and geometry.

3.1.4 Turntable frogs. The turntable frog shall consist of a fabricated steel turntable base supporting a fabricated steel turntable and rail. The angle of rail intersection is the rotation angle for the turntable frog (see table III). The turntable frogs shall be constructed to provide adequate drainage to prevent ponding of rainwater. Additional options for turntable frogs are listed in table III and depicted on NAVFAC drawings 1404040 and 1404041.

TABLE III. Options for turntable frogs (see 6.2).

Option Number	Choose One	Choose one	Description
1	A		Field rails bolted to stub rails (see figure 2).
	B		Field rails welded to stub rails (see figure 3).
2	A		Manually operated throw mechanism.
	B		Power operated throw mechanism.
		a	Cover plates bolted in place.
		b	Cover plates hinged to switch.
3			Specify angle of rail intersection.
4			If turntable frog is to be used on a radius, specify the radius (curvature is used for the stub rails).

3.2 First article. When specified (see 6.2), the contractor shall furnish one track fitting for first article inspection and approval (see 4.2.1 and 6.3).

3.3 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The

MIL-DTL-29229B(YD)

term “recovered materials” means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification.

3.4 Steel. Unless otherwise specified herein, steel used in fabrication of fabricated switches and frogs shall conform to ASTM A 36.

3.4.1 Raised pattern plate. Raised pattern plate used for deck surfaces around switches and frogs shall be rolled floor plate, manufacturer’s standard four way pattern, conforming to ASTM A 786.

3.4.2 Alloy steel plate. Alloy steel plate for alternative construction of ramped frog (see 3.5.1) shall be ASTM A 514.

3.4.3 Surface alloy for ramped frogs and switches. Hard facing alloys shall conform to the following chemical analysis:

<u>Element</u>	<u>Nominal Percentage</u>
Carbon	0.06
Manganese	2.18
Silicon	0.66
Chromium	2.37
Molybdenum	0.66

Brinell hardness shall be 300 to 400.

3.4.4 Rail sections. Steel for rail sections shall be heat treated in accordance with AREA manual for Railway Engineering to a Brinell hardness of 300 to 340. Rail shall conform to ASTM A 1.

3.4.5 Pivot pin. The pivot pin, shown in NAVFAC drawing 1404037, shall be a shouldered cap screw of special quality, open hearth, hot-rolled carbon steel conforming to ASTM A 576 and of a grade suitable for welding.

3.5 Fasteners.

3.5.1 Steel anchors. Headed steel anchors, shown in NAVFAC drawing 1404037, shall be fabricated from cold finished carbon steel conforming to ASTM A 108.

3.5.2 Bolts and nuts. Unless otherwise specified herein, bolts and nuts shall conform to ASTM A 307.

3.5.3 Cap screws. Hold down cap screws shall conform to ANSI B18.2.1 with hexagonal heads and Uniform National Coarse threads.

MIL-DTL-29229B(YD)

3.6 Drawings. The switches and frogs shall be constructed in accordance with NAVFAC drawings listed in 2.1. Drawings forming a part of this specification are engineering design drawings. The contractor shall be responsible for preparing shop drawings. Where tolerances provided could cumulatively result in incorrect fits, the contractor shall provide tolerances within those prescribed on the drawings to insure correct fit, assembly, and operation of the items. Proposed changes by the contractor to the government furnished design drawings shall be approved by the contracting officer. No deviation from the prescribed dimensions or tolerances shall be permissible without prior approval of the contracting officer.

3.7 Construction. Switches and frogs shall be constructed to the dimensions and tolerances shown in applicable drawings and as specified herein.

3.7.1 Alternatives for rigid frog construction. The following two alternative methods of construction are shown in NAVFAC drawings 1403331, 1404038, and 1404039. Alternative "A" consists of a composite construction of ASTM A 36 steel topped by a plate of ASTM A 514 steel which has been case hardened to not less than 350 Brinell hardness. Alternative "B" construction requires a hard facing, as shown in the drawings and described in 3.4.3, on the base material of ASTM A 514 steel plate.

3.8 Finish. Unless otherwise specified herein or on the applicable drawings, surfaces shall be machine finished. Faces of sliding surfaces shall have an average roughness of 63 microinches (1.6 μm) as defined by ANSI B46.1 and ANSI Y14.36.

3.9 Identification marking. Identification marking shall be cast into each unit in a location easily visible after installation. Required information shall include as a minimum:

- a. Manufacturer and location of plant.
- b. Type, class, and style.
- c. Date of manufacture.
- d. Radius of turnout for switches.
- e. Angle (for rigid or turntable frogs).
- f. Radius of curvature for radius type frog.
- g. Applicable rail section(s).

3.10 Workmanship.

3.10.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to ensure uniformity of size and shape.

3.10.2 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surfaces of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts

MIL-DTL-29229B(YD)

connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof or service loadings.

3.10.3 Composite plate welding. Preheat ASTM A514 steel before welding. Preheat and interpass temperatures shall be 450 degrees Fahrenheit (232 degrees Celsius).

3.10.4 Welder qualification. All welders shall be qualified for the types of welds and the welding positions required for use in the construction and fabrication of each unit shown on the applicable drawings and specified herein. Qualification shall be on the type base material and filler utilized in actual construction, or on similar alternate material not requiring operator requalification. Welder qualification shall be performed in accordance with the applicable sections of AWS D1.1. Copies of the qualification record for each qualified welder shall be kept by the manufacturer or contractor and shall be available to authorized Government inspectors when requested.

4. VERIFICATION

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification, where such inspections are deemed necessary to ensure that supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this document shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Material inspection. The contractor is responsible for ensuring that supplies and materials are inspected for compliance with all the requirements specified herein and in applicable referenced documents.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

MIL-DTL-29229B(YD)

4.2.1 First article inspection. The first article inspection shall be performed on one of each type of fitting when a first article is required (see 3.2, 6.2, and 6.3). This inspection shall include the examinations of 4.3 and 4.3.1. The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.3 and 4.3.1. This inspection shall be performed on all units submitted under the contract.

4.3 Examination. Each switch shall be examined for compliance with the requirements specified in section 3 of this document. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.3.1 Welding examination. Visual inspections of welds and weldments shall be performed utilizing the proper mechanical gages, fixtures, and appropriate weld gages. Applicable sections of AWS D1.1 shall be followed including, but shall not be limited to, verification of the following:

- a. Dimensional accuracy of the weldment (including warpage).
- b. Conformance to drawing requirements. (This involves determination of whether all required welding has been done, and whether finished welds conform with regard to size and contour.)
- c. Acceptability of welds with regard to appearance (including such items as surface roughness, weld spatter, etc.).
- d. The presence of unfilled craters, pock marks, undercuts, overlaps, and cracks.
- e. Evidence of mishandling from center punch or other inspection markings or excessive grinding.
- f. Proper marking of areas requiring weld repair.
- g. Subsequent inspection of weld repair.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging materials shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

MIL-DTL-29229B(YD)

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. These crane track fittings are the standard design of the NAVFAC for two-rail, double flange wheel, portal crane trackage and conform to NAVFAC criteria for portal crane track alignment. They are intended for use in new construction and in rehabilitation of existing trackage, where conditions will permit. While a similar commercial product may be available in railway practice for single flange wheels, equivalent designs for double flange wheels are not commercially available.

6.1.1 Rigid frogs. Class B, styles 1 and 2, rigid frogs are two alternative designs which differ in the cross section of the flangeway for use by standard gage railroad wheels.

6.1.1.1 Style 1. The style 1 rigid frog provides a standard AREA flangeway (1.875 inches (47.625 mm) deep) through the entire railway intersection. Railroad wheel loads are carried in normal fashion, bearing only on the treads of the wheels. No ramps for railroad wheel flange bearing across the area of railway intersection are provided. This results in a notch through the crane wheel flangeways (0.875-inch (22.225 mm) deep) due to the difference in depth of railroad and crane wheel flanges.

6.1.1.2 Style 2. The style 2 rigid frog utilizes a nonstandard railroad wheel flangeway. Ramps are employed in the railroad wheel flangeways providing depths varying from not greater than 1.375 inches (34.925 mm) to not less than 0.875 inches (22.225 mm); and railroad wheel flanges bearing is required across the area of the railway intersection.

6.1.2 Half-crossing. Where a standard gage track intersects a crane rail, two rigid frogs are located in close proximity and are usually designed as an integral unit called a half-crossing.

6.2 Acquisition requirements. Acquisition documents must specify the following:

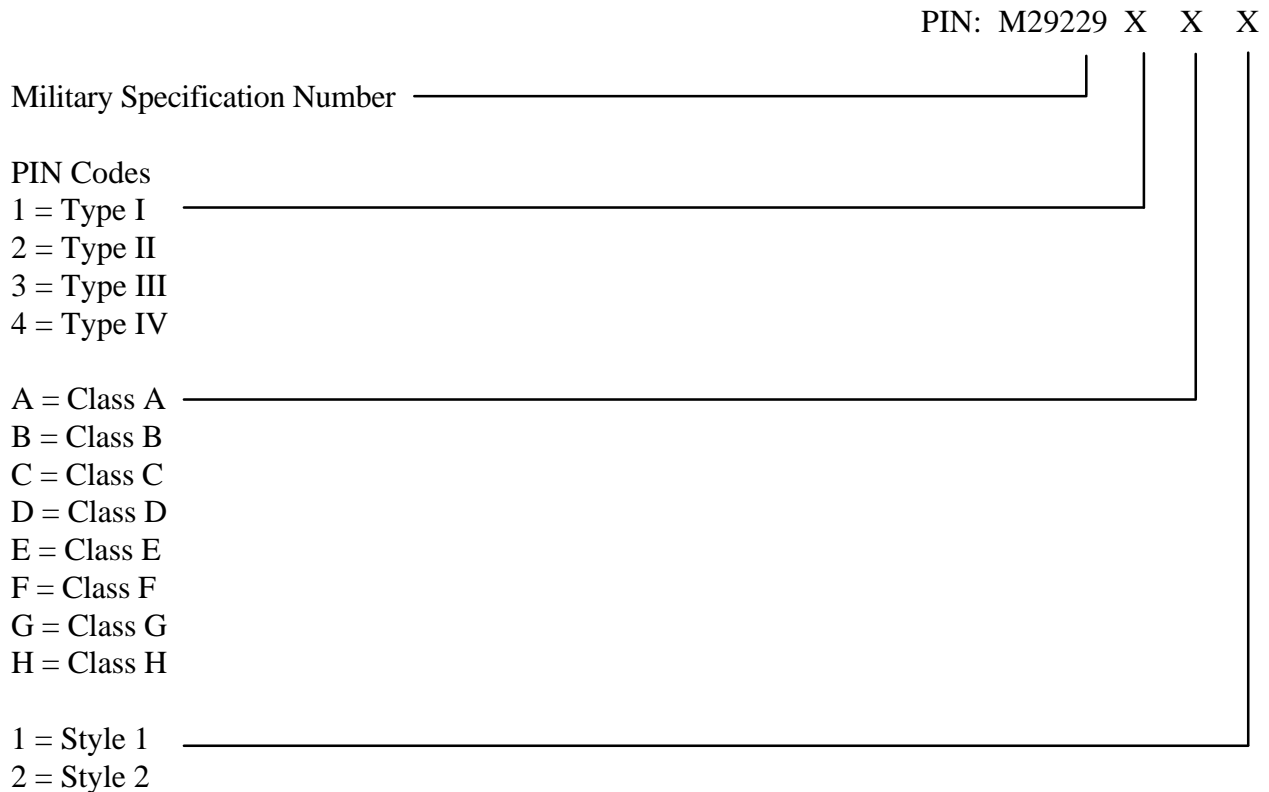
- a. Title, number, and date of this specification.
- b. Type, class, and style required (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).
- d. Whether stub rails are required on switches and intended method of connecting fitting to field rails (see table I, option 1).
- e. Whether cover plates is to be hinged or bolted in place (see table I, option 2).
- f. Whether stub rails are required on rigid frogs and intended method of connecting field rails (see table II, option 1A).
- g. Frog angle (of rail intersection) (see table II, option 2).
- h. Whether straight or radius frog is required and radius of curvature for radius type frog (see table II, option 3).
- i. Method of connecting field rails to stub rails on turntable frogs (see table III, option 1).

MIL-DTL-29229B(YD)

- j. Whether the turntable frog throw mechanism shall be power or manually operated and whether cover plate for power operated throw mechanism enclosure is to be hinged or bolted in place (see table III, option 2).
- k. Rotation angle of turntable frogs (angle of rail intersection) (see table III, option 3).
- l. If turntable frog is to be used on radius and radius of curvature required (see table III, option 4).
- m. When first article is required (see 3.2 and 4.2.1).
- n. Packaging requirements (see 5.1).

6.3 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.4 Part or Identifying Numbers (PINs). The specification number, type, class, and style are combined to form PINs for fabricated frogs and switches covered by this document (see 1.2). PINs for fabricated frogs and switches are established as follows:



MIL-DTL-29229B(YD)

6.5 Subject term (key word) listing.

Double flangeway
Rigid frogs
Single flangeway
Turntable frogs

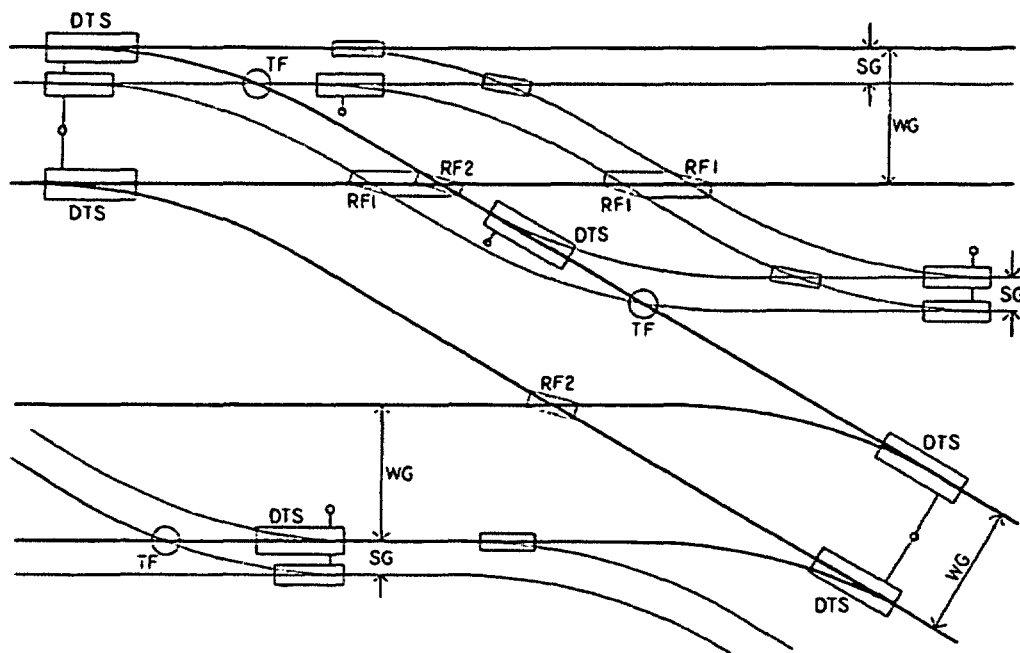
6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Navy - YD1

Preparing Activity:
Navy - YD1

(Project 2250-N100)

MIL-DTL-29229B(YD)



LEGEND:








- | | | |
|---|---------------------------------------|---------|
|  | Double-tongue switchpoint | DTS |
|  | Rigid frog - double/single flangeways | RF1 |
|  | Rigid frog - double/double flangeways | RF2 |
|  | Half crossing - RF2 and RF1 frogs | RF1+RF2 |
|  | Half crossing - two RF1 frogs | RF1+RF1 |
|  | Turntable frog | TF |
|  | Switch throw mechanism | |
| | Wide gauge | WG |
| | Standard gauge | SG |

Figure 1. Typical Crane Rail Fittings.

MIL-DTL-29229B(YD)

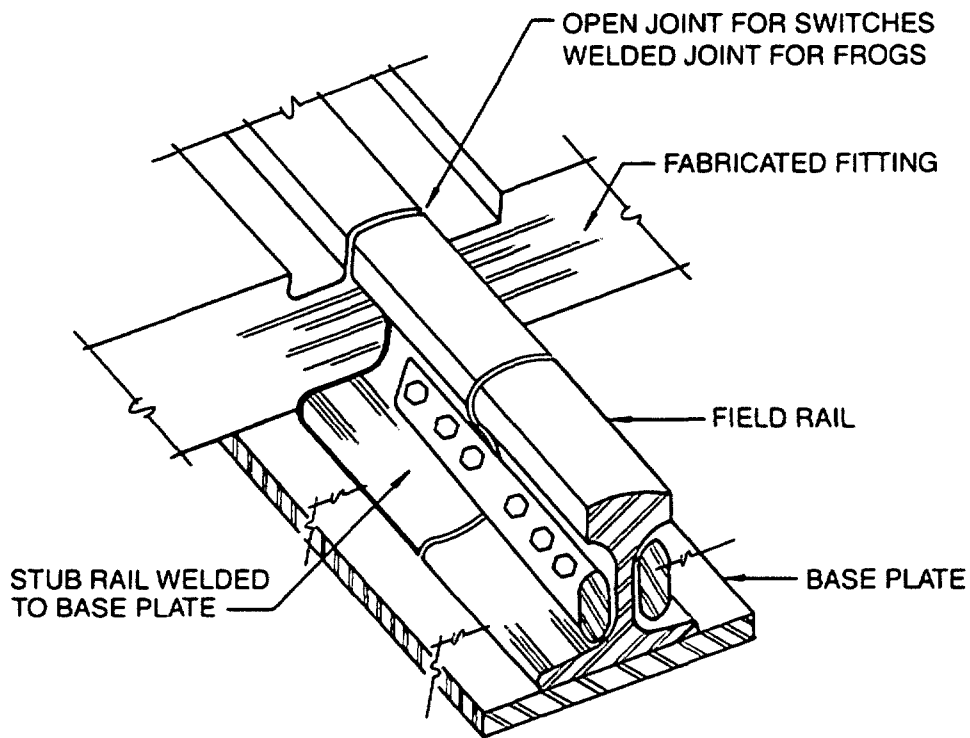


Figure 2. Fabricated Fitting with Bolted Stub Rail.

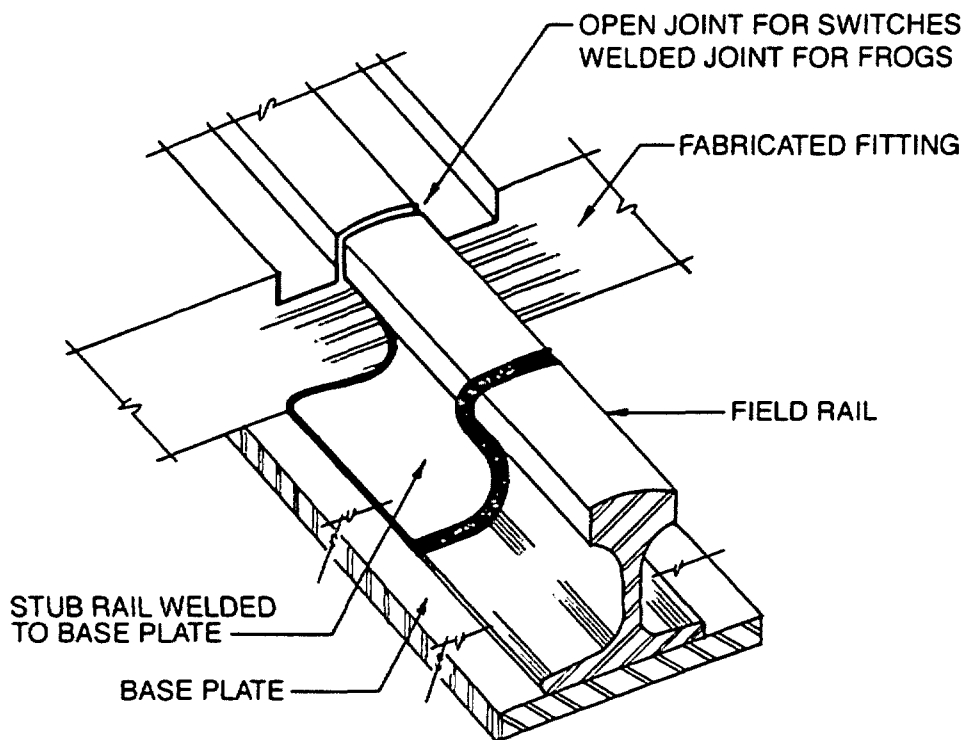


Figure 3. Fabricated Fitting with Welded Stub Rail.

MIL-DTL-29229B(YD)

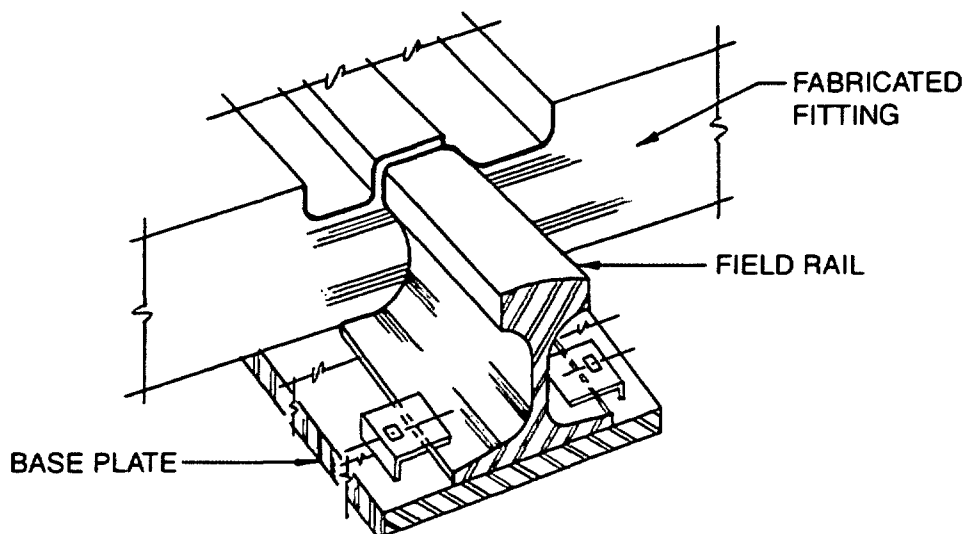


Figure 4. Fabricated Fittings without Stub Rails, Field Rail Bolted.

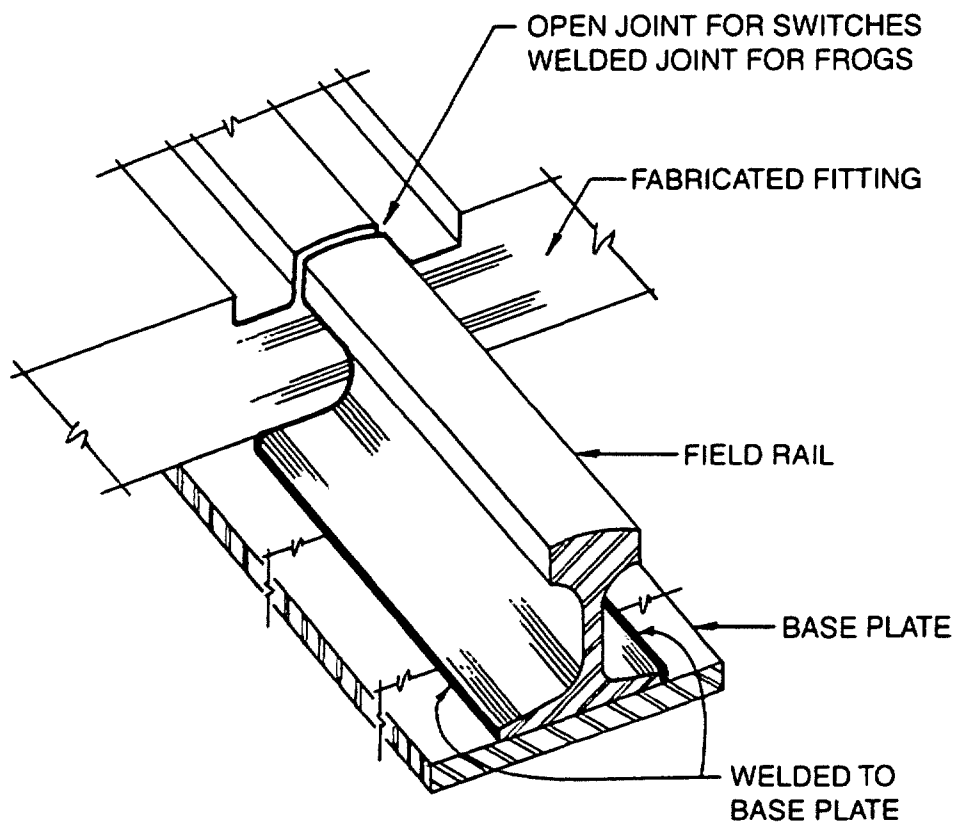


Figure 5. Fabricated Fitting without stub Rails, Field Rail Welded.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER

MIL-DTL-29229B(YD)

2. DOCUMENT DATE (YYMMDD)

970314

3. DOCUMENT TITLE

SWITCHES AND FROGS, TRACK, FABRICATED, FOR PORTAL CRANE

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*

b. ORGANIZATION

c. ADDRESS *(Include Zip Code)*d. TELEPHONE *(Include Area Code)*

(1) Commercial

(2) AUTOVON

(if applicable)

7. DATE SUBMITTED

(YYMMDD)

8. PREPARING ACTIVITY

a. NAME

Rudy Pamplona

b. TELEPHONE *Include Area Code)*

(1) Commercial

805-982-5843

(2) AUTOVON

551-5843

c. ADDRESS *(Include Zip Code)*

COMMANDING OFFICER, NCBC CODE 15E2D

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PORT HUENEME, CA 93043-4301

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DEFENSE QUALITY AND STANDARDIZATION OFFICE

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