



**EXHIBIT D**

**PIPELINE CONSTRUCTION**

**SPECIFICATIONS**

**SADDLE BUTTE PIPELINE, LLC**



PIPELINE CONSTRUCTION SPECIFICATIONS

SADDLE BUTTE PIPELINE, LLC

TABLE OF CONTENTS

1. GENERAL..... 8

1.1. SCOPE ..... 8

1.2. CONSTRUCTION DRAWINGS ..... 8

1.3. CONFLICTS, OMISSIONS AND INTERPRETATIONS ..... 8

1.4. LAWS, REGULATIONS AND PERMITS ..... 8

1.5. CHANGES ..... 9

1.6. EXISTING FACILITIES ..... 9

1.7. CONSTRUCTION MEETINGS..... 9

1.8. PIPELINE MARKERS..... 10

1.9. RIGHT OF WAY FENCES..... 10

1.10. ARCHAEOLOGICAL SITES (Not included in this WORK) ..... 11

1.11. PACE OF WORK..... 11

1.12. INSPECTION ..... 12

1.13. EQUIPMENT..... 12

2. RIGHT OF WAY AND SURVEY..... 12

2.1. ACCESS TO RIGHT OF WAY ..... 12

2.1.1. Right of Way Width ..... 13

2.1.2. Centerline Stakes..... 13

2.1.3. Preservation of Survey Stakes ..... 13

2.1.4. Valve Settings, Pump Stations, Terminals and Other Aboveground Installations ..... 13

3. SITE WORK (Not included in this WORK) ..... 14

4. CLEARING AND GRADING..... 14

5. DITCHING/TRENCHING..... 14

5.1. DIMENSIONS..... 15

5.2. COVER..... 15

5.2.1.	Rock Classification .....	15
5.2.1.1.	Class 1 Rock .....	15
5.2.1.2.	Class 2 Rock .....	16
5.2.1.3.	Class 3 Rock .....	16
5.2.1.4.	Multiple Class Rock Ditch .....	16
5.2.2.	Rock Ditching.....	16
5.2.3.	Extra Depth Ditch .....	16
5.2.4.	Drain Tile and Foreign Lines .....	17
5.2.5.	Temporary Crossings over Open Ditch.....	17
5.2.6.	Ditching Pace.....	17
5.2.7.	Spoil Bank .....	17
5.2.8.	Top-soiling and Double Ditching .....	17
5.2.9.	Blasting.....	18
6.	HANDLING, HAULING, STRINGING AND STORING .....	18
6.1.	SCOPE .....	18
6.2.	MATERIALS AND EQUIPMENT FURNISHED BY COMPANY .....	19
6.3.	MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR.....	19
6.4.	HAULING, HANDLING AND STORAGE .....	19
6.5.	MATERIAL CONTROL AND DOCUMENTATION .....	21
6.6.	TOOLS AND WORK EQUIPMENT.....	21
6.7.	HANDLING UNCOATED STEEL PIPE.....	22
6.8.	HANDLING COATED AND WRAPPED STEEL PIPE .....	22
6.9.	SPECIAL PROVISIONS FOR HANDLING COATING AND WRAPPING MATERIAL.....	22
6.10.	HANDLING NON-FERROUS PIPE .....	23
6.11.	HAULING.....	23
6.12.	DEMURRAGE .....	23
6.13.	PERMITS.....	23
6.14.	STRINGING.....	24
7.	BENDING .....	24
7.1.	FIELD BENDING STEEL PIPE.....	24

7.2.	FIELD BEND DATA—STEEL PIPE .....	25
8.	WELDING .....	25
9.	LAYING AND LOWERING .....	25
9.1.	SWABBING .....	26
9.2.	VALVE SETTINGS AND LATERAL SETTINGS .....	26
9.3.	LOWERING .....	26
9.3.1.	COMPANY Approval .....	26
9.3.2.	Method .....	27
9.3.3.	Holiday Detection (Jeeping) .....	27
9.3.4.	Bends .....	27
10.	LINE PIPE COATING .....	27
10.1.	EXTERNAL FIELD JOINTS AND DAMAGE REPAIR - EXTRUDED PLASTIC PIPE COATING AND FUSION BONDED EPOXY PIPE COATING .....	27
10.1.1.	Coating Repair and Joint Repair .....	27
10.1.2.	Shipment and Handling .....	27
10.1.3.	Heat-Shrinkable Sleeves for Field Joints .....	28
10.1.4.	FBE Coating Repairs (Small Damage) .....	28
10.1.5.	Coating Repairs (Larger Damage) .....	28
10.1.6.	Holiday Detection .....	29
10.1.7.	ARO Coating and Joint Repairs .....	29
11.	PAINTING AND COATING .....	29
11.1.	SMALL COATING REPAIRS OF BURIED PIPE .....	29
11.2.	CONTRACTOR MATERIALS AND LABOR .....	29
11.3.	COATING BARE UNDERGROUND PIPE AND FITTING .....	29
11.4.	COATING FOREIGN PIPELINE CROSSINGS .....	30
11.5.	PAINTING .....	30
11.6.	PAINTING AND COATING SPECIFICATIONS .....	30
12.	BACKFILL .....	30
12.1.	COMPANY APPROVAL .....	30
12.2.	UNCOVERED PIPE IN DITCH .....	30

12.3. BACKFILL MATERIAL .....	30
12.4. BACKFILL METHOD—STEEL PIPE .....	31
12.5. FINAL COMPACTION .....	32
12.5.1. Restoration of Construction Areas .....	32
12.5.2. Crown.....	32
12.5.3. Irrigation and Drainage .....	32
12.5.4. Reinforcing Backfill.....	33
13. RADIOGRAPHIC INSPECTIONS AND TESTING .....	33
13.1. CONTRACTOR DUTY .....	33
14. HYDROSTATIC TESTING .....	34
14.1. GENERAL.....	34
14.1.1. Test Instruments .....	35
14.1.2. Testing Records .....	35
14.2. WATER—SOURCES, QUANTITY & QUALITY.....	36
14.3. PIPE CLEANING .....	37
14.4. HYDROSTATIC LEAK TEST.....	37
14.5. FAILURES.....	39
14.6. DEWATER.....	40
14.7. TIE-INS .....	40
14.8. INHIBITOR INJECTION (Not included in this WORK).....	41
14.9. SAFETY AND COMMUNICATIONS.....	41
15. WATER BODY, STREAM, AND DITCH CROSSINGS.....	42
15.1. WATER CROSSING .....	42
15.1.1. Ditch.....	42
15.1.2. Installation.....	42
15.1.3. Pulling or Pushing .....	43
15.1.4. Water Fill .....	43
15.1.5. Weights and Anchors (details will be supplemental).....	43
15.1.6. Buoys.....	43
15.1.7. Cover.....	43

15.2. ROAD AND RAILWAY CROSSINGS .....	44
15.2.1. Approval .....	44
15.2.2. Highway or County Road Boring .....	44
15.2.3. State and County Road Crossing .....	44
15.2.4. Temporary Bridges .....	44
15.2.5. Backfill.. .....	45
15.2.6. Casing.....	45
15.2.7. Support.....	45
15.2.8. Safety.....	46
15.2.9. Insulators and End Seals .....	46
15.2.10.    Cover .....	46
15.2.11.    Final Acceptance .....	46
15.3. TEST LEADS .....	46
15.3.1. Foreign Pipeline Crossings.....	47
15.3.2. Installation.....	47
16. HOT TAPS (Not included in this WORK) .....	47
17. CLEAN UP .....	47
18. SEEDING .....	48
19. INSTRUMENTATION AND ELECTRICAL (Not included in this WORK) .....	48
20. INSULATION AND HEAT TRACE (Not included in this WORK) .....	48
21. SAFETY, HEALTH, AND LOSS PREVENTION REQUIREMENTS .....	48
21.1. ACCIDENT AND INCIDENT REPORTING AND INVESTIGATION .....	49
21.2. ALCOHOL, ILLEGAL DRUGS, AND FIREARMS .....	50
21.2.1. Prohibited Items .....	50
21.2.2. CONTRACTOR Programs and Requirements .....	50
21.3. SAFETY RULES AND PROCEDURES .....	50
21.3.1. Jobsite Hazard Awareness and Mitigation .....	51
21.3.2. Job Hazard Analysis Process .....	51
21.3.3. HSSE Observation Card / Near Misses.....	51
21.3.4. Pre-Construction / Job Safety Meetings .....	52

21.3.5. Personal Protective Equipment (PPE) .....	52
21.4. SIMULTANEOUS OPERATIONS (SIMOPS) .....	53
21.5. WORKING PERMITS .....	54
21.5.1. Safe Work Permits.....	54
21.5.2. Hot Work Procedures and Permit .....	54
21.5.3. Confined Space Permit .....	55
21.5.4. Lock Out / Tag Out Permit .....	55
21.5.5. Lifting Permit .....	56
21.6. MATERIAL SPECIFICATION DATA SHEETS (MSDS) .....	56
21.7. SAFETY REQUIREMENTS FOR COMPANY OPERATING UNITS.....	57
21.7.1. Little Missouri Plant.....	57
21.7.2. COMPANY Operating Unit Work—Safety Execution Plans and Special Safety Requirements .....	57

## 1. GENERAL

### 1.1. SCOPE

This EXHIBIT D provides Construction SPECIFICATIONS to define COMPANY technical and quality requirements for CONTRACTOR's performance of the WORK under the AGREEMENT of which this EXHIBIT is a part. The specific WORK covered by this AGREEMENT is illustrated by the Construction DRAWINGS in EXHIBIT E. Special requirements and provisions beyond the scope of this general construction Specification, but applicable specifically to the WORK hereunder are defined in EXHIBIT A, WORK RELEASE AND DESCRIPTION OF WORK.

### 1.2. CONSTRUCTION DRAWINGS

COMPANY will provide to the CONTRACTOR the Construction DRAWINGS listed in EXHIBIT E, and may from time to time provide revised DRAWINGS which reflect changes, clarifications, or corrections. The CONTRACTOR shall establish and maintain a drawing control system: to ensure that WORK is done only on the basis of DRAWINGS which have been approved for construction; to ensure the timely distribution of revised DRAWINGS to the appropriate CONTRACTOR personnel; and to ensure that obsolete revisions are discarded or clearly marked to show that they have been superseded.

### 1.3. CONFLICTS, OMISSIONS AND INTERPRETATIONS

The CONTRACTOR shall not take advantage of any conflict within this EXHIBIT D, or between this EXHIBIT D and other EXHIBITs in this AGREEMENT; or of any inadvertent omission or discrepancy. If any such conflict, omission or discrepancy is discovered or if any matters herein are subject to conflicting interpretations or require further interpretation; then, the CONTRACTOR shall immediately bring the matter to the attention of the COMPANY Representative for resolution prior to execution of WORK.

### 1.4. LAWS, REGULATIONS AND PERMITS

The CONTRACTOR, in his performance of the WORK hereunder, shall comply with all applicable laws, ordinances and regulations, and the CONTRACTOR shall be responsible for obtaining all necessary permits and licenses, except for those permits specifically listed as being furnished by COMPANY.

The CONTRACTOR shall comply with all requirements and provisions of all applicable permits, whether permits are obtained by the CONTRACTOR or by COMPANY.

The CONTRACTOR shall carry out all activities hereunder in accordance with the requirements of Title 29, CFR, Part 1926, "Occupational Safety and Health Standards

for the Construction Industry”; and as applicable, with the requirements of Title 49, CFR, Part 192 “Transportation of Natural and Other Gas by Pipeline, Minimum Federal Safety Standards”, and with the requirements of Title 49 CFR Part 195 “Transportation of Hazardous Liquids by Pipeline”.

#### 1.5. CHANGES

COMPANY wishes to make clear at this time that CONTRACTOR shall bid the WORK appropriately to complete the WORK, knowing the policies, practices, and preferences of COMPANY.

No claims or charges will be allowed by COMPANY for additional WORK or materials, or for demurrage; and no substitution of material or changes in price will be permitted except on written authority from COMPANY. Any WORK executed without a signed Change Order by COMPANY may not be paid.

The party requesting the change will initiate the Change Order. The Change Order will be documented on the Change Order Form (see EXHIBIT A SCHEDULE 3, CHANGE ORDER FORM). Approval by COMPANY is required before the Change Order can be implemented.

#### 1.6. EXISTING FACILITIES

##### WARNING

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PHYSICALLY ASCERTAIN THE ACTUAL LOCATION AND NATURE OF ALL PIPELINES, POWER LINES, TELEPHONE LINES AND CABLES, OTHER UTILITY LINES, AND ALL OTHER EXISTING FACILITIES WHICH MAY AFFECT OR BE AFFECTED BY THE WORK HEREUNDER, WHETHER OWNED BY COMPANY OR BY OTHERS, AND WHETHER OR NOT SUCH PIPELINES AND OTHER FACILITIES ARE SHOWN ON THE CONSTRUCTION DRAWINGS.

CONTRACTOR shall be responsible for notification of owners and operators whose facilities may be located in the work area or whose facilities may be involved in or affected by the WORK hereunder. Additionally, CONTRACTOR shall notify any local “One Call” system. Such notification shall be made sufficiently in advance of the beginning of construction so as to allow interested or affected parties to locate and mark their facilities and to have representatives present during excavation or other operations which might affect their facilities.

#### 1.7. CONSTRUCTION MEETINGS

CONTRACTOR’S Construction Supervisor shall meet with COMPANY Representative for a Preconstruction meeting before the commencement of any WORK. Thereafter, CONTRACTOR and COMPANY will meet as necessary to

prepare and update a construction activities plan. The plan will be prepared after the meeting, by CONTRACTOR, and at a minimum, shall include crew work locations and activities, permits required and permit or Right of Way stipulation compliance activities and inspection, and archaeological monitoring manpower needs. COMPANY may require additional information to be included on the plan. Also see Section 21.1 SAFETY, HEALTH, AND LOSS PREVENTION REQUIREMENTS for information regarding safety-related meetings.

CONTRACTOR shall also attend the following construction meetings:

- Morning tailgate meetings
- Other meetings as requested by the COMPANY Construction Manager or the SBP Project Manager.

#### 1.8. PIPELINE MARKERS

CONTRACTOR shall set pipeline markers provided by COMPANY at all fence lines, on each side of road crossings, railroad crossings and stream crossings, and at foreign pipeline crossings. In addition, sufficient markers shall be placed at direction changes and in cross country terrain such that a marker is visible ahead and behind each marker placed. In no case shall the line be marked at less than one fourth mile intervals without COMPANY approval.

CONTRACTOR shall remove, preserve and replace third party pipeline or facility markers which conflict with pipeline construction activities. If any pipeline markers are damaged or destroyed, markers shall be replaced at CONTRACTOR'S cost. CONTRACTOR shall replace all removed or destroyed markers with a representative of the third party present to ensure accurate location.

#### 1.9. RIGHT OF WAY FENCES

CONTRACTOR, after ascertaining from COMPANY that permission has been secured from the property owner and reviewing contact stipulations on COMPANY Construction Line List, shall notify the land owner or tenant before taking down any fences or opening gaps in fences or other improvements. Before any wire fence is cut to make a temporary gap, double posts must be set on each side of opening and braced and guyed securely. The wires shall be cut on one end only, then rolled back and saved to rebuild the permanent fence. The temporary wire gate must have the same number of strands and gauge of wire as existing fence; however the wire used shall be barbless to protect the pipe coating. The bottom strand of the gate shall be no more than 1 foot from grade at any time. Where road banks are cut for ROW access, gates shall be installed. Any wire strands that are cut during the construction of the pipelines shall be repaired immediately. If installing a non-wire temporary gate, ensure it will withstand the service expected of the original fence, and meets landowner and tenant approval.

CONTRACTOR shall be responsible for keeping all gates or gaps closed at all times during performance of WORK. CONTRACTOR shall furnish watchman if deemed necessary in order to keep all gates or gaps closed.

At the direction of COMPANY Representative or his Designee the CONTRACTOR shall install permanent gates when required. Generally, gates will be located where repeated access to the right of way is necessary for operational reasons, or if a CONTRACTOR is having repetitive difficulties in properly closing temporary gates. Gates will only be located as directed by COMPANY, and after assurance that LANDOWNER and TENANT approval has been granted. Permanent gates shall be aluminum or galvanized or painted steel of sufficient width to allow passage of tractors and mowers. Permanent gates and H bracing will be supplied by and installed by CONTRACTOR.

CONTRACTOR shall make permanent repair of cattle guards, fences and other enclosures through which he has had temporary gates or other means of passage without expense or liability to COMPANY. New and like-new material shall be used at the CONTRACTOR'S expense. Structures shall be placed in condition as good as or better than at the beginning of construction. These repairs shall be satisfactory to the owner and his tenant. CONTRACTOR shall remove all other temporary means of access to the Right of Way which he may have installed, except any which may (by agreement with COMPANY) be left for later use by maintenance crews or the landowner.

CONTRACTOR shall repair and restore to original condition all public Right of Ways at the points where they have been intersected by the pipeline Right of Way.

CONTRACTOR shall replace any milepost markers, well location signs or other markers in fence lines at their original position. Care shall be taken that the markers are removed and stored safely until replaced undamaged upon completion of the WORK.

#### 1.10. ARCHAEOLOGICAL SITES (Not included in this WORK)

If WORK involves archaeological sites, COMPANY will provide ATTACHMENT 1 ARCHAEOLOGICAL SITES for more details and requirements.

#### 1.11. PACE OF WORK

COMPANY reserves the right to limit the distance between CONTRACTOR'S crews. CONTRACTOR assumes full responsibility for completing the WORK within the allotted time despite inclement weather, unforeseen site conditions or labor stoppages.

## 1.12. INSPECTION

All WORK shall be done to the satisfaction of COMPANY Representative or his Designee(s). Requests, direction, and comments made by COMPANY Representative do not relieve CONTRACTOR from compliance with these SPECIFICATIONS and associated CONSTRUCTION DOCUMENTS. CONTRACTOR remains fully accountable and responsible for performance of WORK, including safety and quality.

## 1.13. EQUIPMENT

CONTRACTOR's equipment and supplies shall be in first class condition. COMPANY assumes no responsibility for CONTRACTOR's or SUB-CONTRACTOR's tools or equipment.

## 2. RIGHT OF WAY AND SURVEY

### 2.1. ACCESS TO RIGHT OF WAY

CONTRACTOR shall observe all provisions and restrictions contained in the COMPANY easements and rights-of-way (EXHIBIT I RIGHT OF WAY CONSTRUCTION LINE LIST & EXHIBITS) and shall observe all associated stipulations. Likewise, CONTRACTOR shall ensure that all of his personnel, SUB-CONTRACTORS, and VENDORS on the worksites and Rights of Ways are informed of and observant of these provisions, restrictions, and stipulations.

COMPANY has obtained all easements for Right of Ways and permits for road and railroad crossings. CONTRACTOR shall access the Right of Way only from approved public roads and points specifically designated by COMPANY Representative. No two-track roads will be used unless specifically authorized by COMPANY Representative. The entire pipeline is within restricted Right of Way at all locations. CONTRACTOR shall adhere to all restrictions within the Construction Line List provided by COMPANY. Temporary work space has been defined in the Construction Line List. This AGREEMENT does not grant any additional work space. Any additional work space used by CONTRACTOR must be acquired by CONTRACTOR after COMPANY approval, at CONTRACTOR's sole cost and risk. Such agreements shall be in writing (with landowner's signature) and copies shall be furnished to the COMPANY before entry onto said land. Lease roads to be used must be dressed as required by COMPANY Representative before use. During clean up and restoration roads must be restored with a 4% crown, water bars and ditches at 2% centerline slope, as required COMPANY Representative. See also SECTION 6 of this EXHIBIT D, HANDLING, HAULING, STRINGING, AND STORING, for additional road requirements.

Settlement of any off Right of Way damages is the sole responsibility of CONTRACTOR; however COMPANY, at its option, may be present during

negotiations and may, in the case of disagreements between landowners and CONTRACTOR, settle the damage claim on CONTRACTOR'S behalf. All off Right of Way damage shall be the sole responsibility of the CONTRACTOR and CONTRACTOR shall defend, indemnify (including payment of attorney's fees) and hold COMPANY harmless from claims resulting thereof.

2.1.1. Right of Way Width

Standard Right of Way width is listed in EXHIBIT I RIGHT OF WAY. All exceptions to this width are listed in EXHIBIT I, as well as other restrictions such as extra depth ditch or earthwork requirements. CONTRACTOR shall be responsible to note such location(s) and restrict its activities accordingly. Temporary use areas are identified on the DRAWINGS, in EXHIBIT I and/or EXHIBIT E DRAWINGS.

2.1.2. Centerline Stakes

COMPANY will mark route of line with centerline and Right of Way boundary stakes. Stakes will be of such regularity that continuity may be maintained, normally at 100 to 200 foot intervals. These stakes will also be used to gauge construction progress and to reference specific locations on DRAWINGS and in reports.

CONTRACTOR is responsible for locating existing pipelines, sewers, water or gas mains, and electric or telephone installations. CONTRACTOR shall take all necessary precautions to protect and to avoid damage or interference with these facilities and shall repair these lines immediately if damaged.

2.1.3. Preservation of Survey Stakes

CONTRACTOR shall offset the centerline stakes a uniform distance as required for clearing and grading. After clearing and grading, CONTRACTOR shall reset the stakes in their original position. CONTRACTOR shall be held responsible for the preservation of all stakes and marks. CONTRACTOR shall bear the cost of replacing any stakes destroyed or lost and re-survey work required.

2.1.4. Valve Settings, Pump Stations, Terminals and Other Aboveground Installations

COMPANY shall establish the property lines, restrictions, and a bench mark for all above-ground facilities.

All other grades, lines, levels, and bench marks shall be established and maintained by CONTRACTOR who shall be responsible for same. CONTRACTOR shall verify all grades, lines, levels and dimensions as

shown on the DRAWINGS, and he shall report any errors or inconsistencies in the above to COMPANY before commencing WORK.

3. SITE WORK (Not included in this WORK)

If Site Work other than clearing and grading for pipeline is required, COMPANY will provide ATTACHMENT 2 SITE WORK for more details and requirements.

4. CLEARING AND GRADING

CONTRACTOR shall clear, grub, and grade the Right of Way to allow for safe, efficient pipeline construction. All vegetation, trees, stumps, roots and debris shall be cleared from the Right of Way prior to grading. All materials so removed shall be hauled and disposed of as directed in the Right of Way stipulations, or on the edge of the Right of Way, as directed by the COMPANY Representative. No snow, timber, soil, brush, or any other debris shall ever be placed off of the approved Right of Way without written authorization from the landowner and COMPANY approval. All soil shall be removed from brush piles and placed back on the Right of Way. Timber must be handled to the satisfaction of COMPANY and the Right of Way stipulations. Brush and other materials shall not be pushed back against the edges of growing trees where it would become inaccessible and damage the growing timber. No material, including snow may be pushed off the designated Right of Way. Timber cut from the Right of Way may not be used for construction purposes unless there is a written agreement between CONTRACTOR and the landowner, after receiving permission from COMPANY. CONTRACTOR is responsible for furnishing to COMPANY copies of such agreements before any activity commences. Timber over 6 inches in diameter shall be cut and stacked into cord wood and placed in a location out of the way for construction and within the Right of Way at a location agreeable to the landowner unless dictated otherwise. Stumps of cut trees must not project over the top of ground, and the ditch line must be cleared so as not to interfere with satisfactory pipeline ditching and backfilling operations. Grading the Right of Way to provide a level, safe working surface shall be conducted under guidance of COMPANY, and sloping shall be in accordance with OSHA 1926 safety regulations.

5. DITCHING/TRENCHING

It is COMPANY's intention that the ditching required on this job will be done with mechanical means. All ditch which can be dug with wheel ditchers, backhoe, dragline, ripping and hoeing, rock plows or similar equipment is considered normal excavation.

Rock excavation shall be defined as soils requiring breaking of the solid rock into removable pieces by drilling shot holes and blasting, requiring mechanical or pneumatic breakers, requiring ripping as per SECTION 5.2.2 Rock Ditching or by rock sawing. Prior approval by COMPANY is required for payment for rock excavation. COMPANY reserves the right to specify the means of rock excavation.

The ditch will be excavated along the alignment staked by COMPANY, except that where alignment changes direction, ditch will be dug to accommodate pipe bent to specified minimum radius.

It is the CONTRACTOR'S responsibility to comply with the Occupational Safety and Health Act and State Trenching and Shoring Regulations, and COMPANY ditch entry requirements where personnel are required to WORK in the ditch.

No spans except those specifically listed in EXHIBIT E DRAWINGS will be permitted.

## 5.1. DIMENSIONS

Ditch shall be excavated to sufficient depth to provide specified cover, allowing for any padding required. Ditch width measured at the bottom of the ditch shall allow at least 6 inches of padding between the outside diameter of pipes and the sides of the ditch. At points where work on the pipe in place in the ditch is to be performed, as for example, tie-ins, sufficient extra excavation will be made so that work can be performed without being cramped for space.

When two (2) or more lines are installed in the same ditch, the minimum clearance between the lines shall be 12 inches. The COMPANY Inspector shall have the option to require extra clearance in rocky or extreme conditions on steep hills and wash crossing.

## 5.2. COVER

Where the gas line is installed in a ditch, the minimum cover shall be 5 feet 0 inches. Where the crude line is installed in a ditch, the minimum cover shall be 4 feet 0 inches. Water line minimum cover shall be 6 feet 0 inches unless noted otherwise. Locations differing from the minimum cover shall be noted in EXHIBIT I RIGHT OF WAY or on the DRAWINGS IN EXHIBIT E. In all cases, cover shall be measured from final grade level (excluding crown) on the lower side of the ditch.

### 5.2.1. Rock Classification

The type of rock excavation encountered and how the rock is to be removed will be determined by COMPANY in conjunction with the excavation efforts by the CONTRACTOR. COMPANY and CONTRACTOR shall agree as to the method of rock removal and classification of rock encountered on a case by case basis and shall do so as early as possible during trenching operations.

#### 5.2.1.1. Class 1 Rock

Class 1 Rock shall be defined as rock which can be removed after being ripped by a D-8 Tractor, or larger, which is in good condition, with a ripper. The CONTRACTOR shall attempt to

rip all rock which is located in order to determine if it is Class 1 Rock.

5.2.1.2. Class 2 Rock

Class 2 Rock shall be defined as rock which cannot be removed through excavation after ripping or if ripping is not possible with the equipment described above. Excavation of Class 2 Rock requires a rock saw or equivalent rock excavation equipment.

5.2.1.3. Class 3 Rock

Class 3 Rock shall be defined as rock which cannot be removed by mechanical means without blasting.

5.2.1.4. Multiple Class Rock Ditch

Should different classes of rock be encountered during excavation through different strata of any ditch, CONTRACTOR will be paid for each class of rock which is proportionally encountered throughout the depth of the ditch.

5.2.2. Rock Ditching

Ditching through rock where rock excavation is required shall provide a minimum cover over pipeline as specified in SECTION 5.2 COVER, or as otherwise specified in EXHIBIT E DRAWINGS. In addition, if the bottom of ditch is in rock, or has hard protrusions capable of damaging pipe coating, ditch must be padded with 6 inches below and 12 inches above the pipe of select material free of rocks or clods greater than 1-1/2 inches in any dimension. Ditch must be of sufficient depth to accommodate pad, pipe, and specified cover. Padding shall be provided by CONTRACTOR at the bid price in EXHIBIT B PRICE SCHEDULE. No water is allowed in the ditch before starting to install padding.

Bid prices for rock excavation shall be based on the lineal feet of rock removed, and shall be paid in addition to the normal per foot lay price.

Extra ditch width and depth obtained due to removing more material than required shall not be included in calculation of extra costs.

5.2.3. Extra Depth Ditch

Extra depth ditch as required, including the circumstances listed below, shall be provided at no extra cost: at crossings with foreign lines as needed to go under the foreign line with a minimum of 24 inches clearance; at stream, irrigation canals or water crossings; at farm terraces or other contours requiring extra depth to avoid sharp bends; at railroad and road or

highway crossings as shown in the EXHIBIT E DRAWINGS or as specified in the permit. Railroad, road, highway and foreign pipeline crossings shall conform to SECTIONS 15.2 ROAD AND RAILWAY CROSSINGS, and 15.3.1 Foreign Pipeline Crossings of these specifications.

5.2.4. Drain Tile and Foreign Lines

It shall be CONTRACTOR'S responsibility to locate and avoid damage to foreign lines along or across pipeline route. In the case of drain tile, CONTRACTOR will provide at least 24 inches clearance, temporary support of the tile, and replace any damaged tile as quickly as possible in order that drain tile functioning is impaired for the least possible time.

5.2.5. Temporary Crossings over Open Ditch

CONTRACTOR shall provide and maintain suitable crossings over open ditch where required by landowner or tenant to move livestock or equipment.

5.2.6. Ditching Pace

Ditching operations shall be timed so that ditch does not stand open for an extended period of time. This restriction on ditching operation speed is intended to reduce hazard of accidents due to open ditch and risk of loss of ditch due to bad weather rather than to slow the pace of the job.

5.2.7. Spoil Bank

The spoil bank from the ditching operations shall not be contaminated by organic and other foreign materials which would produce an unsatisfactory backfill. CONTRACTOR shall cut gaps or openings in the spoil bank so that excessive rains will not cause water to back up and flood cultivated fields. The spoil bank shall be at least 2 feet from the ditch.

5.2.8. Top-soiling and Double Ditching

Double Ditching: Unless specified otherwise in EXHIBIT A WORK RELEASE AND DESCRIPTION OF WORK, EXHIBIT E DRAWINGS, EXHIBIT I RIGHT OF WAY, within these SPECIFICATIONS, and/or directed by the COMPANY Representative, CONTRACTOR shall Double Ditch the width of the pipeline ditch line by removing organic topsoil to a depth of 6 inches and segregate these materials on the Right of Way such that there will be no cross contamination with the rest of the ditch excavation materials.

Top-Soiling; At locations where Top-Soiling is specified, CONTRACTOR shall remove organic topsoil to a depth of 6-inches across the full width of the working area, including ditch line and working side, and segregate these materials on the Right of Way such that there will be no cross contamination with the rest of the excavated materials.

For both Double Ditching and Top-Soiling work there shall be an approximate 2 feet spacing offset between topsoil spoils and excavation spoils. When topsoil is pulled back onto the ditch line or working side, as appropriate, care shall be taken to avoid commingling with underlying soil material. Topsoil shall be wheel roll compacted into place.

5.2.9. Blasting

When blasting is necessary to dig the ditch, such blasting shall not be done until other utilities/pipeline operators, occupants of nearby buildings, stores, residences, or places of business, and farmers have been notified by CONTRACTOR sufficiently in advance to protect personal property, and livestock. The COMPANY Inspector shall be present during blasting. CONTRACTOR shall blanket shots to prevent damage to nearby structures, telephone, telegraph, or power lines. Care must be exercised by the CONTRACTOR to prevent damage to underground structures, such as cable, conduits, and pipelines. This applies also to springs and other underground water courses. CONTRACTOR must comply with utility and pipeline operator stipulations when blasting near those facilities.

If, during blasting operations, loose rock is scattered over the Right of Way or adjacent property, the CONTRACTOR shall clean up such rock and dispose of it to the satisfaction of the COMPANY Representative and the landowner and his tenants at no extra cost to COMPANY. Any necessary permits for blasting shall be secured by CONTRACTOR at his expense. Damage caused by blasting shall be paid for by the CONTRACTOR, whether caused by the CONTRACTOR or his SUBCONTRACTORS, employees, or agents. All of the conditions listed in SECTION 3 SITE WORK shall apply to blasting the ditch.

6. HANDLING, HAULING, STRINGING AND STORING

6.1. SCOPE

This section specifies requirements for hauling, handling, storage, inspection, identification, control, and documentation for materials and equipment furnished both by the COMPANY and by the CONTRACTOR.

## 6.2. MATERIALS AND EQUIPMENT FURNISHED BY COMPANY

COMPANY shall furnish the materials and equipment specified in EXHIBIT F COMPANY-FURNISHED MATERIALS, in the quantities specified, at the locations specified, and in accordance with the specifications therein referenced. The CONTRACTOR shall inspect and take custody of all COMPANY-furnished materials and equipment at the specified locations and shall be responsible for such materials and equipment in accordance with the terms of EXHIBIT F. The hauling, handling, storage, inspection, identification, control and documentation for such COMPANY furnished material and equipment shall conform to the requirements of this section as applicable.

## 6.3. MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR

The CONTRACTOR shall furnish all materials and equipment of every kind required for performance and completion of the WORK in accordance with this AGREEMENT, except for those specific materials and/or equipment to be furnished by COMPANY as expressly listed in EXHIBIT F COMPANY-FURNISHED MATERIALS. Hauling, handling, storage, inspection, identification, control and documentation for such CONTRACTOR furnished materials and equipment shall conform to the requirements of this section as applicable. All materials and equipment furnished by the CONTRACTOR shall be subject to the approval of COMPANY. CONTRACTOR furnished materials and equipment which will become a part of the finished WORK shall be high-quality, new materials and shall be in accordance with the referenced specifications and standards.

## 6.4. HAULING, HANDLING AND STORAGE

All material and equipment, whether furnished by COMPANY or by the CONTRACTOR, shall be hauled, handled and stored by the CONTRACTOR so as to prevent damage, deterioration, vandalism, theft or loss. It is the responsibility of the CONTRACTOR to carefully inspect all material and equipment when it is delivered into CONTRACTOR's custody, to ensure that the items are undamaged, that the quantities are correct, and that the items conform to the descriptions and specifications. After their acceptance by the CONTRACTOR, the replacement or repair of any material or equipment, required as a result of loss, damage, deterioration, non-compliance with specifications, mis-identification or non-traceability of documentation shall be for the CONTRACTOR's account.

Care shall be exercised during loading, hauling and unloading to prevent damage to material or equipment. Loads shall be securely tied down and carefully blocked and padded to prevent damage to: pipe, pipe coating or weld bevels; weld bevels on fittings; machined surfaces on flanges or equipment; exposed shafts on rotating equipment; exposed or fragile appurtenances such as ladders or insulation on vessels or equipment; or other items.

Care shall be exercised during handling and lifting to protect personnel and existing facilities and to prevent damage to material or equipment. Rigging shall be done only by qualified personnel using slings, cables and accessories which are in good repair and suited to the job. Lifting equipment shall have capacity and reach for the lift intended, shall be in good repair and shall be operated by qualified personnel. Rigging, lifting and handling of major equipment items and vessels shall be done in strict accordance with the MANUFACTURER's instructions. The CONTRACTOR shall notify COMPANY in advance of major lifts to provide the COMPANY Representative the opportunity to witness such lifts.

With the prior approval of COMPANY, items such as pipe, large fittings and flanges, vessels, large equipment, structural steel, items to be installed outside, and other large items which are not particularly susceptible to pilferage or to damage from the weather may be stored outside. CONTRACTOR shall make all appropriate arrangements with respect to outside storage of material and equipment to prevent damage, deterioration, vandalism, loss or theft. Material storage shall comply with the following requirements:

- All items shall be stored on pallets, skids or timbers to prevent contact with the earth.
- Items requiring protection from direct weather exposure shall be protected by tarpaulins or temporary shelters.
- All nozzles, connections, vents and other openings in vessels and equipment shall be sealed to exclude moisture, animals or foreign matter.
- All machined surfaces shall be protected with a suitable anti-corrosion coating.
- Bare pipe 14 inches and larger shall be stacked not more than 4 tiers high (2 tiers for coated pipe 14 inches and larger). Bare pipe 12 inches and smaller shall be stacked not more than 10 tiers high (4 tiers for coated pipe 12 inches and smaller.) Tiers shall be separated with suitable timbers and blocking shall be installed to prevent pipe movement. For coated pipe, lateral separators are also required and lateral and vertical separators shall be padded to prevent damage to the coating.
- Pipe fittings and similar open items shall be stacked so that rainwater shall not collect in such items.
- The CONTRACTOR shall consult and comply with the MANUFACTURER's instructions for items which require special maintenance during storage. E.g.: Periodic checks or shaft rotation, lubrication, desiccant replacement, etc.
- Material and equipment not approved for outside storage shall be stored in warehouses. Provisions shall be made as necessary to protect sensitive items from extreme temperatures. Unless otherwise specifically provided, all warehouse facilities shall be provided by the CONTRACTOR.

## 6.5. MATERIAL CONTROL AND DOCUMENTATION

The CONTRACTOR shall establish and maintain material control procedures and keep comprehensive records for all material and equipment, whether furnished by the CONTRACTOR or COMPANY, to ensure accurate identification of all material and equipment and to ensure traceability of all quality control and other documentation. Items which cannot be accurately identified, or which cannot be appropriately documented shall not be installed.

For record purposes of as-constructed installations (as-built documentation) and to assist inspection and survey personnel to ascertain installed material and the location of same, the CONTRACTOR shall:

Unless otherwise clearly marked and visible for inspection and survey, coated line pipe, pipe fittings, valves, flanges, and similar piping shall be marked with a durable marking material or tag approved by the COMPANY REPRESENTATIVE with the following information:

Item Tag No. (if applicable)

Purchase Order No. (if applicable)

Material Heat Number (for pipe, line pipe, and fittings)

Specification, Grade, and Wall Thickness (for pipe, line pipe, and fittings)

Each weld shall be marked as follows:

Each welder shall mark each of his welds with the unique identification number assigned to him;

Welds inspected by radiography and/or other NDT inspection method shall be marked with the inspection record number, including radiographic film number if applicable;

Weld marking shall be placed in the top quadrant of the pipe;

Steel die stamping shall not be used.

## 6.6. TOOLS AND WORK EQUIPMENT

The CONTRACTOR shall provide all vehicles, work equipment, tools and expendables required for the expeditious performance of the WORK hereunder. All such items shall be suitable for the WORK, in good repair, in compliance with any applicable laws or regulations related to their condition or use and acceptable to COMPANY.

#### 6.7. HANDLING UNCOATED STEEL PIPE

Pipe shall not be subjected to jars or impacts, but shall be lifted or lowered from one level to another by canvas slings or pipe hooks. When lifting pipe 8 inches in diameter and larger, special lifting hooks, equipped with a plate curved to fit the curvature of the inside of the pipe shall be used. In the case of pipe having caps, equipment with curved plate or cup to fit the outside of the pipe shall be used. No punching of caps will be permitted. In loading pipe on trucks or barges, each length shall be lowered to position without dropping, and each succeeding length shall rest evenly with other lengths on the truck. Pipe shall not be rolled off the trucks. After loading, suitable chains shall be used to tie the load securely to each bolster.

#### 6.8. HANDLING COATED AND WRAPPED STEEL PIPE

Coated and wrapped pipe shall be handled at all times with wide nonabrasive canvas or leather belts, or other equipment designed to prevent damage to coating. All such equipment shall be kept in repair so as to prevent injury to the coating. The use of tongs, bare pinch bars, chain slings, rope slings without canvas covers, canvas or composition belt slings with protruding rivets, pipe hooks without proper padding, or any other handling equipment found to be injurious to the coating shall not be permitted. All joints and sections of coated and wrapped pipe shall be picked up clear of the ground and not dragged over the ground. Coated pipe shall not be subjected to jar or impact, and all skids used to support coated pipe shall be padded. Walking on coated pipe shall not be permitted.

Coated and wrapped steel pipe shall be raised or lowered to or from the stockpile, ground, truck, barge, or rail car, by canvas slings or pipe hooks and carried by wire rope on chain sling with a "spreader bar" between lifting lines. Pipe shall not be rolled off the trucks. The bolsters of the truck and trailer should have a bearing surface of not less than 12 inches to give necessary support to the padding which protects the coating. Sacks partly filled with sand or sawdust should be placed on the bolsters and between the outside bottom pipes and the bolster stakes. In general, maximum piling height on trucks shall be limited to two tiers, and all chains, cables, or other equipment used for fastening the load must be carefully padded.

#### 6.9. SPECIAL PROVISIONS FOR HANDLING COATING AND WRAPPING MATERIAL

Coating and wrapping materials shall be hauled in such manner as to prevent injury to the packages. No package shall be handled with hooks or dropped or thrown from trucks, barges, or rail cars. All rolls of glass fiber reinforcing and wrapping felt shall be stored on end, in a dry place, kept from contact with concrete flooring and protected from the weather. Glass fiber reinforcing and felt wrapper shall not be strung along the Right of Way, but shall be transported along the line by covered conveyance and removed as needed, directly to the site of the wrapping machine.

Any such materials that in COMPANY's opinion show evidence of deterioration due to weathering or any cause may be rejected by COMPANY.

#### 6.10. HANDLING NON-FERROUS PIPE

All non-ferrous pipe, such as fiberglass or polyethylene, shall be stored and handled in its original bundled or reeled shipping state until the pipe is strung on the Right of Way. Bundles shall be handled in a manner which will prevent damage to the pipe walls and ends. All protective end caps shall remain in place until the pipe is ready to be joined on the Right of Way. Nylon or other non-abrasive belts shall always be used, never chains. When loading non-ferrous pipe from the yard, forklift tongues shall be covered by wood, plastic or other pad material to prevent contact of the steel with the pipe.

#### 6.11. HAULING

CONTRACTOR shall unload or load and haul all materials, supplies, machinery, and equipment used or to be used for the installation of line and appurtenances from delivery points specified in EXHIBIT F COMPANY-FURNISHED MATERIALS to the points along Right of Way where same are to put to use, whether same are furnished by COMPANY or CONTRACTOR. CONTRACTOR shall be liable for damage to any roads including bridges, culverts, and cattle guards. Loading, hauling, and unloading shall be performed in such manner as to prevent damage to pipe and other materials; and, if pipe and materials sustain damage, CONTRACTOR shall be responsible for all repair and replacement costs.

CONTRACTOR shall provide floats or trailers of sufficient length that pipe joints or bundles do not sustain damage from overhang. Belt straps shall be used to prevent shifting and damage to bundles.

#### 6.12. DEMURRAGE

CONTRACTOR shall protect and indemnify COMPANY against any charge for demurrage, shortage, or other charges incident to failure or delay to promptly unload. If, at any time, cars of pipe, valves, or other material are diverted or shipped to points other than original destinations at request of or for convenience of CONTRACTOR, the expenses of such diversion shall be paid by CONTRACTOR.

#### 6.13. PERMITS

CONTRACTOR shall secure, without cost to COMPANY, any and all permits (including permits necessary for the transportation of pipe and other materials), licenses, or authorizations which may be necessary in connection with his operations hereunder other than the usual pipeline Right of Way grants or easements, and railroad, highway, river, or other crossing permits on the Right of Way which COMPANY shall secure and furnish as above provided. Railroad, highway, and river

permits obtained by COMPANY do not necessarily cover moving equipment across such locations.

#### 6.14. STRINGING

CONTRACTOR shall string the pipe along the Right of Way and shall align the same in accordance with good pipeline construction practices using only the pipe furnished by COMPANY. Stringing of pipe on the Right of Way shall be done in such a manner as to cause least interference with the normal use of the land crossed, and gaps shall be left at intervals to permit use of the land, and passage of farm stock, and equipment across the Right of Way.

Pipe is to be unloaded from the stringing trucks and lowered to ground on COMPANY Inspector approved padded skids by using canvas slings or pipe hooks. Pipe is not to be rolled off the truck. In areas where the Right of Way crosses rocky terrain, special care shall be exercised in lowering the pipe to see that pipe is not dropped on rocks or allowed to rest on sharp and jagged surfaces. Dragging the pipe will not be permitted. A control rope will be attached to hooks to control the suspension of the pipe at each end during stringing operations. Pipe shall not be strung without COMPANY approval.

After pipe has been strung, it will be inspected by COMPANY and CONTRACTOR. CONTRACTOR shall reimburse COMPANY for all damaged pipe.

### 7. BENDING

#### 7.1. FIELD BENDING STEEL PIPE

CONTRACTOR shall make all necessary field bends required in the construction of the line except those shop bends which COMPANY shall specifically furnish in accordance with EXHIBIT F COMPANY-FURNISHED MATERIALS.

CONTRACTOR shall also fit the pipe to the contour of the bottom of the ditch, and shall restrict the arc and increase the radius of the bends to such an extent as will prevent the buckling or flattening of the pipe, weakening of welds, and will permit the free passage through said bend of an internal inspection type of pipeline scraper. All bends shall be made using a lined bending shoe so as to eliminate scratching and gouging of the pipe.

Dimensions across the minimum and maximum axis of the field bends will be subject to measurement and shall not have a difference in excess of 2.5% of the nominal diameter. Any bends which exceed this limit shall be removed from the line at CONTRACTOR'S expense. Any pipe thus removed will be charged to the CONTRACTOR as damaged material.

Each field bend shall comply with the following:

- The bend must be smooth and uniform.

- On pipe 12 inches and larger an internal mandrel shall be used.
- After bending the pipe must be free from buckling, cracks, or any other mechanical damage and must conform to the profile of the completed ditch.
- There must be no wrinkle bends or mitered bends (not including deflections up to 3° which are caused by misalignment).
- No girth weld may be placed inside the bending shoe if the weld protrudes above the outer wall of the pipe.
- Pipe containing a longitudinal weld must be bent so that the seam is located near the neutral axis.
- No bend shall be made any closer than 5 feet from the end of a joint or 3 feet from an existing girth weld.

7.2. FIELD BEND DATA—STEEL PIPE

All field bends shall be made by the cold stretch bending method, and an accurate method of measurement shall be used to determine the tolerances as follows:

<u>Pipe O.D., inches</u>	<u>Deflection of Longitudinal Axis, degree*</u>	<u>Minimum Radius of bend in Pipe Diameters</u>
Smaller than 12-3/4	Maintain wall thickness	18D
12-3/4	3.2	18D
14	2.7	21D
16	2.4	24D
18	2.1	27D
20 and larger	1.9	30D

\* Maximum deflection in an arc length equal to the outside diameter.

8. WELDING

See EXHIBIT L PIPELINE WELDING SPECIFICATIONS.

9. LAYING AND LOWERING

The pipe shall first be placed on skids or earth berms above the ground at sufficient height to accommodate welding. The length of line in which only stringer beads and hot passes have been completed shall be limited to 1,000 feet in any one section at the end of each

day's work. These sections shall be blocked up in such a manner that the pipe will not crawl off due to contraction and expansion.

#### 9.1. SWABBING

Swabbing line pipe joints is not required for the Project, unless required by COMPANY Representative due to excessive debris or poor pipe handling and as a precaution to ensure debris is not inside the pipe.

CONTRACTOR shall use all reasonable precautions to keep the pipeline free from dust, dirt, debris, welding spatter or any other foreign matter during the WORK. At the end of each day's work all open ends of welded sections of pipe shall be capped with devices acceptable to COMPANY to prevent entry of foreign matter. Where temporary gaps are left in the pipeline, the open ends of the welded pipe section on either side of the gap shall be capped and the caps kept in place until the gaps are tied-in. CONTRACTOR shall be responsible for any obstructions inside the pipeline resulting from CONTRACTOR's negligence that may prevent the proper passage of scrapers during the test operations. Prior to the testing operation, additional cleaning shall be required as specified in these SPECIFICATIONS.

Any open ends lowered into the ditch shall have watertight caps. Any sections found open or not watertight shall at COMPANY's discretion be swabbed or pigged in a manner satisfactory to COMPANY before that section is tied into the line. Such swabbing or pigging shall be done at CONTRACTOR'S expense.

#### 9.2. VALVE SETTINGS AND LATERAL SETTINGS

Valve and/or lateral setting installations include the concrete foundation, valve and dogleg barricades, valve boxes, and make up of all piping in accordance with the DRAWINGS. The installations shall be completed as the pipeline is laid and before cleaning and testing.

In order to minimize relative movement and the resulting stresses wherefrom, special care shall be taken in preparing the ditch and in back filling in the vicinity of a valve installation. The pipe shall rest on firm soil. Any disturbed soil in the bottom of the ditch shall be compacted by tamping.

Sacked 1:3 concrete-sand supports shall be provided if satisfactory compaction cannot be achieved. Tamping or sandbag supports will be at CONTRACTOR'S expense.

#### 9.3. LOWERING

##### 9.3.1. COMPANY Approval

No pipe shall be lowered into the ditch until COMPANY approval to proceed is given.

9.3.2. Method

All steel pipe shall be handled with web belts or canvas slings at least as wide as the pipe diameter. Slings shall be constructed so that they can be removed from under the pipe without dragging metal eye hooks or the clevis against the pipe. The ditch bottom shall be relieved beneath the sling so that the sling material does not drag on the coating.

Alternatively, the pipe may be cradled into the ditch providing that the cradle does not cut, deform or otherwise damage the coating.

9.3.3. Holiday Detection (Jeeping)

The coating shall be holiday tested before lowering in. The Holiday Detector shall run across the pipe behind the last lower-in tractor unless operator safety is at risk due to ditch width. Holiday detection will be performed in accordance with SECTION 10.1.6 HOLIDAY DETECTION.

9.3.4. Bends

Over-bends and sags shall fit the contour of the ditch bottom. Side bends shall not contact the inside ditch wall.

10. LINE PIPE COATING

10.1. EXTERNAL FIELD JOINTS AND DAMAGE REPAIR - EXTRUDED PLASTIC PIPE COATING AND FUSION BONDED EPOXY PIPE COATING

10.1.1. Coating Repair and Joint Repair

All steel pipe shall be factory coated. Materials for repairs to the coating and for coating welded joints shall be provided by the CONTRACTOR.

10.1.2. Shipment and Handling

Prior to accepting pipe for construction, CONTRACTOR shall inspect and advise COMPANY of any coating damage to mill coated pipe caused by shipment from the pipe mill or coating yard.

During handling, storage and stringing the pipe shall be handled in accordance with MANUFACTURER's recommendations to avoid damage to the coating.

CONTRACTOR shall, at no cost to COMPANY, replace or repair all damage to the pipe or coating after his acceptance of the pipe.

10.1.3. Heat-Shrinkable Sleeves for Field Joints

CONTRACTOR shall furnish, unless specified otherwise, Canusa-CPS K-60 shrink sleeves. Refer to ATTACHMENT 3 PAINTING AND COATING SPECIFICATIONS for MANUFACTURER'S data sheet and installation guide. Shrink sleeves shall be installed according to MANUFACTURER'S installation instructions, current edition.

10.1.4. FBE Coating Repairs (Small Damage)

CONTRACTOR shall furnish, unless otherwise specified, DuPont 7-1677S Green E-Z Patch and Dupont 7-1631S Red E-Z Patch Stick. Refer to ATTACHMENT 3 PAINTING AND COATING SPECIFICATIONS for MANUFACTURER'S Technical Information Sheets with Application Guidelines. Repairs shall be applied according to MANUFACTURER'S applications instructions, current edition. All coating defects disclosed by visual or holiday detector inspection shall be repaired at no additional expense to COMPANY. For small pinholes or metal sliver holidays where repairs by the patching stick method are approved by COMPANY, the surface shall be thoroughly cleaned and abraded. The patching stick materials used shall be compatible with the fusion bond epoxy coating system.

After application of the patch stick, the circumference of the pipe around the abraded and repaired area shall be primed and taped.

10.1.5. Coating Repairs (Larger Damage)

CONTRACTOR shall furnish, unless otherwise specified, DuPont 7-1677S Green E-Z Patch and Dupont 7-1631S Red E-z Patch Stick. Refer to ATTACHMENT 3 PAINTING AND COATING SPECIFICATIONS for MANUFACTURER'S Technical Information Sheets with Application Guidelines. Repairs shall be applied according to MANUFACTURER'S applications instructions, current edition. All patches to be used for coating repairs shall be of the type in which the MANUFACTURER guarantees that the thermo-chromic indicator color change is permanent, where specified.

Repairs to coatings may be made per this specification for damage less than 10 inches long and greater than 2 inches as measured along the pipe's length. For damages greater than 10 inches, the pipe shall be cleaned and recoated at the CONTRACTOR'S expense. Repairs shall not be made during inclement weather without prior written COMPANY approval of procedures. Patches not applied per MANUFACTURER'S instruction, damaged due to overheating or misuse, and/or failing the holiday inspection shall be removed and replaced at CONTRACTOR'S expense.

10.1.6. Holiday Detection

After all joints and damaged areas have been coated, a continuous electric holiday detector test shall be made by the CONTRACTOR to the satisfaction of COMPANY immediately preceding the lowering in operation. The detector shall be capable of testing at 100 volts per mil of coating thickness. The detector shall be furnished and operated by the CONTRACTOR. All holidays located shall be repaired and rechecked with the detector. Holiday detectors shall be calibrated with volt meters twice a day by CONTRACTOR.

10.1.7. ARO Coating and Joint Repairs

Field joint coating for all dual powder coated pipe installed in directional drills and bores at roads, railroads, creeks, etc. shall be Powercrete J Solids epoxy coating system. Data sheets and installation information application procedures are provided in the Exhibits.

11. PAINING AND COATING

CONTRACTOR shall furnish skilled labor, supervision, equipment and tools to paint all newly installed above-ground piping, fittings and other appurtenances in accordance with the following Paint Specification for surface preparation, application and materials.

11.1. SMALL COATING REPAIRS OF BURIED PIPE

Buried pipe coating repairs that meet the criteria of SECTION 10.1, EXTERNAL FIELD JOINTS AND DAMAGE REPAIR—EXTRUDED PLASTIC PIPE COATING AND FUSION BONDED EPOXY PIPE COATING, shall be repaired according to SECTION 10.1 of this EXHIBIT D.

11.2. CONTRACTOR MATERIALS AND LABOR

CONTRACTOR shall furnish skilled labor, supervision, equipment and tools for coating and painting WORK. All painted coating materials shall be new.

11.3. COATING BARE UNDERGROUND PIPE AND FITTING

Bare or painted steel pipe, fittings, valves and appurtenances that are below grade or coated steel material with coating damage greater than 2 square inches shall be coated with two-part Liquid Epoxy System per Engineering Specification No. 03-1102 (B) (Note: Coal Tar System not allowed.)

#### 11.4. COATING FOREIGN PIPELINE CROSSINGS

Where directed by COMPANY the CONTRACTOR shall coat all foreign pipelines crossed. The coating shall extend to the edges of the ditch. Coating shall be two part Liquid Epoxy System per Engineering Specification No. 03-102 (B).

#### 11.5. PAINTING

Above grade piping shall be painted in accordance with Engineering Specification 03-101, Painting Specification for Structural Steel and Piping—Above Grade, dated August 24, 2011. Finish coat color shall be Shale Green.

Galvanized steel shall not be painted.

Bare structural steel and shop primed structural steel shall be painted in accordance with Engineering Specification 03-101, dated August 24, 2011. Finish color shall be Shale Green.

#### 11.6. PAINTING AND COATING SPECIFICATIONS

The following SPECIFICATIONS are included in Attachment 3, PAINTING AND COATING of this EXHIBIT D:

- Engineering Specification 03-101, Painting Specification for Structural Steel and Piping—Above Grade, dated August 24, 2011
- Engineering Specification 03-102, Painting Specification for Structural Steel and Piping—Below Grade, dated February 12, 2012

### 12. BACKFILL

The backfill operation shall include disposal of any excess excavation spoil. CONTRACTOR may reject any spoil or padding which it considers unfit to be used.

#### 12.1. COMPANY APPROVAL

No ditch shall be backfilled until the pipe is at the proper depth, correctly spaced, and approval to proceed is given by COMPANY.

#### 12.2. UNCOVERED PIPE IN DITCH

Backfilling at road crossings shall immediately follow lowering in. The maximum permissible amount of uncovered pipe in the ditch is one-half mile.

#### 12.3. BACKFILL MATERIAL

Fill from bottom of ditch to 12 inches above top of pipe shall be free from rocks, frozen clods, or other hard objects. CONTRACTOR shall bear the cost of any special

treatment necessary to eliminate such hard objects. Unless specified otherwise, topsoil shall be segregated from other spoil and placed at the top of the fill to the specified depth. In cultivated areas, no rock shall be placed in the top of the fill above the depth of normal tilling. Surplus rock shall be disposed of by CONTRACTOR to the satisfaction of COMPANY, landowner or tenant. CONTRACTOR shall also comply with any requirement concerning the order in which respective materials are backfilled, contained in the applicable Right of Way restriction, EXHIBIT I RIGHT OF WAY.

#### 12.4. BACKFILL METHOD—STEEL PIPE

No ditch shall be backfilled unless COMPANY Inspector is present and the pipe is to proper depth, fits the ditch, and rests on proper bedding. COMPANY will inspect and approve all pipe before backfilling any section of the ditch.

Immediately after the pipe has been lowered, it shall be shaded by filling the ditch over the pipe with backfill material. The first material to be placed over and around the line shall be loose earth, free from all rock larger than 1-1/2 inches in diameter, vegetation, and foreign objects. CONTRACTOR shall keep the shading as close as possible to the lowering in operation.

Backfilling shall be done with a backfill machine or other appropriate method to minimize the impact of the Right of Way and to maintain the minimum distance of disturbance. Backfilling shall be done in such a manner as to insure filling the space below and up the sides of the pipe with loose earth. CONTRACTOR shall employ any acceptable method approved by COMPANY which will insure compaction of the backfill and at the same time not deflect the pipe from its normal roundness. Packing of backfill shall not be done through rocky land where the coating might be damaged, nor through sections where drain tile is encountered and might be damaged.

Where padding of the pipe is required, material shall be deposited in ditch simultaneously on both sides of the pipe. In the event the native ditch material is considered by COMPANY to be unsuitable for backfill material, the CONTRACTOR shall purchase, haul, place and select backfill material in accordance with these instructions. CONTRACTOR may use a padding machine to achieve padding requirements without hauling select back fill to the work site. In locating a source for the select backfill material, CONTRACTOR will be responsible for the archaeological clearance from the BLM, BOR, or others. Padding shall extend across the full width of the ditch and be thoroughly compacted until a minimum of 12 inches of padding is in place. If more than one (1) pipeline is in the ditch, the select backfill material shall be placed between the lines and shall be brought to a level of 12 inches above the highest line. COMPANY has the option to require additional padding in extremely rocky areas. The remaining backfill shall be placed in the pipeline ditch and spread on both sides of the pipeline ditch. Right of Way which has been disturbed during construction shall be graded and tilled in a manner satisfactory to COMPANY and the landowner or his tenant and seeded if required by COMPANY.

All backfilling across drainage ditches, irrigation ditches, terraces, levee districts, railroads, public highways, private drives, trails, roads, or streams shall be compacted to at least 95% standard Proctor density throughout in a manner satisfactory to COMPANY and to any private or governmental authority having jurisdiction.

## 12.5. FINAL COMPACTION

Compaction may be accomplished by tamping or other method approved by COMPANY. "Walking in" with a tracked or wheeled vehicle is normally acceptable on wide ditches, subject to prior COMPANY approval. There shall be a minimum of 30 inches cover over the pipes before compaction by vehicles. The wheel or track must be narrower than the ditch line for effective compaction. Where non-ferrous or large diameter thin wall pipe (D/t greater than 50) is involved, a limit may be placed by COMPANY on the maximum weight of the vehicle, or there may be a requirement that the line be pressurized during the operation. Compaction to a density which will prevent excess settling of the ditch backfill material is required.

At road crossings where selected backfill material is required, it shall have the proper moisture content to reach the necessary 95% compaction, and the moisture content shall be uniform throughout each layer.

### 12.5.1. Restoration of Construction Areas

All roads, slopes, creek banks, levees, and other places where CONTRACTOR has moved earth to facilitate the movement or operation of his equipment shall be restored to original profile and condition, to the satisfaction of COMPANY and the property owner. Where specified on alignment sheets, a COMPANY Representative and Inspector must be present and agree to begin work.

### 12.5.2. Crown

Backfill over the pipe ditch shall be crowned to a height of not less than 8 inches and not more than 12 inches above the adjacent ground surface, except through irrigated farm land where the backfill will be compacted to the satisfaction of COMPANY and the landowner in accordance with EXHIBIT I RIGHT OF WAY. Through rocky lands where livestock is confined, 20-foot wide gaps shall be provided across the backfilled line at 100-yard intervals to provide passageway for livestock.

Gaps shall be level with surrounding ground and surfaced with backfill material free from large and sharp rocks, all to the satisfaction of COMPANY Representative, the landowner, or his tenant.

### 12.5.3. Irrigation and Drainage

When backfilling across irrigated fields, CONTRACTOR shall provide furrows across pipeline Right of Way as required by COMPANY,

landowner or tenant, to direct the flow of water into normal irrigation courses.

The finished backfill must be sufficiently level to permit normal irrigation, even if harrowing, disking, or hand raking is required. Where the use of borrowed dirt is necessary to crown the backfill to the required height, the manner and method of securing dirt must be approved by COMPANY and those having jurisdiction of the property. All terraces, levees, and sides of drainage or irrigation canals, and all roads and highways which are cut shall be backfilled in six inch layers and each layer thoroughly tamped by hand or machine to provide a good bond between the undisturbed sides of the ditch and the new backfill material.

When backfilling on hillsides or sloping ground, 4-foot high furrows or terraces shall be provided across the pipeline ditch to direct the flow of water into the natural drainage courses and away from the pipeline ditch. In no case is surface drainage to be diverted into channels other than the ones they followed before the line was laid. Particular care shall be exercised in order that all drainage ditches shall be maintained and left unobstructed to prevent the backing up of water against the spoil bank or backfill crown.

#### 12.5.4: Reinforcing Backfill

As necessary, CONTRACTOR shall reinforce the backfill in the banks of rivers, streams, ravines, or other water courses, irrigation or drainage ditches, and farm terraces with earth filled sacks, rock rip-rap, or concrete headwalls. CONTRACTOR shall, at his own expense, repair damage to levees, roadways, lanes, private drives, and farm terraces, as may be caused by settling or washing through the ditch portion of same, up to and including the date of acceptance of the WORK included herein and through the one (1) year warranty period, unless specified otherwise.

### 13. RADIOGRAPHIC INSPECTIONS AND TESTING

Radiographic inspection of welds and other construction inspection will be done by COMPANY.

#### 13.1. CONTRACTOR DUTY

CONTRACTOR shall cooperate with COMPANY personnel and assist as required.

CONTRACTOR shall keep COMPANY personnel informed of CONTRACTOR's schedule for welding and subsequent operations, particularly with regard to tie-ins and other welds removed from the firing line.

CONTRACTOR shall make the welds accessible through maintaining the Right of Way in a condition to be traversed by the inspection vehicle and where necessary, furnishing suitable towing or hauling equipment.

#### 14. HYDROSTATIC TESTING

##### 14.1. GENERAL

CONTRACTOR shall perform the WORK necessary to successfully test the pipeline to insure internal cleanliness, the strength of the pipe and facilities, and that no leaks exist. Two weeks before the start of any test, the CONTRACTOR shall submit a test procedure to COMPANY for approval. The testing operations shall be conducted diligently, thoroughly and continuously without unnecessary delays in a safe and workmanlike manner in accordance with acceptable pipeline testing practices and as further defined in this Specification. As a minimum requirement, the secondary zone of backfill must be compacted in place before any testing occurs.

CONTRACTOR shall furnish test instruments, water strainers and filters; fill and pressure pumps; air compressors and air boosters; piping, valves and fittings incidental to water testing and disposal, sectionalizing, transferring water from one test section to another, connecting test instruments to pipeline and manifold pumping equipment; meters for measuring water; facilities for injecting and proportioning chemical additives, if required, superintendents, labor, transportation and welding equipment, mobile and portable radio equipment for use by CONTRACTOR and COMPANY's Representative; and such other expendable material and supplies as may be required to successfully clean, test, dry, repair or replace faulty or defective material or WORK, and tie-in the entire pipeline, except such material specified in EXHIBIT F COMPANY-FURNISHED MATERIALS, to be furnished by COMPANY. All equipment furnished by CONTRACTOR shall be subject to approval of COMPANY.

CONTRACTOR shall furnish an enclosed, leak proof, properly lighted and heated tent or doghouse, of sufficient size to house the pressure recorders, deadweight and test personnel at the data procurement site of each test section during the complete fill, pressurization, test and water disposal periods. To assure stabilization of the test instruments, the above enclosure shall not be moved during operation of the test instruments. CONTRACTOR shall furnish ample lighting for all operating compressors, pumps, tents or doghouses and test manifolds connected to pumps or compressors during all darkness hours of cleaning, filling, pressurization, and testing.

CONTRACTOR will furnish sizing plates and pigs for cleaning, water filling, and dewatering.

Whether the testing is or is not subcontracted, CONTRACTOR shall furnish a foreman or superintendent whose sole function and responsibility will be to successfully supervise the testing operations. This foreman or superintendent shall not be a member of the testing SUBCONTRACTOR's organization.

The CONTRACTOR shall make available, without interference to his pipeline construction operations, equipment, supervision, personnel and materials necessary for use in fabricating, installing and removing manifolds, laying and connecting fill lines, installing and removing pigs, filling, pressuring and water removal, locating and repairing leaks, breaks or defects in the pipeline, removal of material and equipment after a section of line has been tested and accepted, and performing all other WORK as may be required to successfully complete the test.

All piping for the pipelines will be cleaned with water, by running a cleaning pig and sizing plate through the pipelines, in accordance with SECTION 14.3 PIPE CLEANING. After cleaning is complete, the pipelines will be filled with test water and tested in accordance with SECTION 14.4 HYDROSTATIC LEAK TEST. Upon successful completion of the test, the lines shall be depressurized, dewatered, and the sizing plate rerun through the pipelines. The connection at the end of each test section shall be capped to protect and to seal the pipe. These caps (plastic) shall be supplied by the CONTRACTOR.

The CONTRACTOR shall furnish all blinds, caps, bleed valves and all other fittings or valves necessary for testing and cleaning.

#### 14.1.1. Test Instruments

The CONTRACTOR shall furnish the following instruments:

- a. Temperature Recorder: The recorder shall have a 24 hour chart, a range of 0°F, 1% full-scale accuracy, a calibration date no older than one year, and shall be in good operating condition.
- b. Pressure Recorder: The recorder shall have a pressure rating from 0 to 2500 psig, 1% accuracy, and appropriate charts and ink. It shall have a calibration date no older than one year and shall be in good operating condition.
- c. Dead Weight Tester: The tester will be certified for accuracy and capable of measuring to 2500 psi in increments of 1 psi. Calibration records for the tester shall be less than one year old.
- d. Thermometer: A thermometer to measure ambient temperature during the test shall be required.

#### 14.1.2. Testing Records

CONTRACTOR's testing records shall include:

- a. Name of individual doing the testing.
- b. Test medium used.
- c. Test pressure, water temperature and test duration.

- d. The ambient temperature during the test will be recorded with the pressure readings.
- e. Test chart: Dead weight recording every 30 minutes for the duration of the test.
- f. Location of the test.
- g. Volume measure and temperature of any added or removed water.
- h. Time the test started and time the test ended.
- i. Size of pipe and wall thickness.
- j. Elevation of highest point of line.
- k. Any leaks or failures on the test, and description of each.
- l. Each test and chart shall be witnessed and signed by CONTRACTOR Inspector before approval is accepted.

#### 14.2. WATER—SOURCES, QUANTITY & QUALITY

CONTRACTOR shall provide water for hydrostatic testing. CONTRACTOR shall advise COMPANY Representative in writing of water source and quality.

The CONTRACTOR shall be responsible for making the appropriate connections to the water truck or water source at the test location and providing pumps, piping and other necessary equipment to transfer the test water from the trucks and/or tanks to the pipeline.

For gas and crude pipelines, the CONTRACTOR shall be responsible for removing the water from the pipeline after the test and dewatering of the pipeline at location defined in the hydrostatic discharge permit. If the discharge permit requires hauling and disposing of the water off location, the CONTRACTOR shall be responsible. COMPANY shall be responsible for obtaining all permits for hydrotest water.

If required, CONTRACTOR shall inject COMPANY supplied chemical additives with the test water.

CONTRACTOR shall add these chemicals to the test water uniformly as it is pumped into the pipeline. After an analysis of the water being used has been made, COMPANY may direct a variation from the standard water treatment. If this is necessary, adjustment shall be made at the chemical metering pump after checking the fill water analysis at the pipeline inlet.

CONTRACTOR shall not inject into the pipeline system any chemical whatsoever without prior written approval of COMPANY Representative.

If required, a filter shall be provided which will be of a quality to remove 99 percent of all particles 92 micron in diameter or larger in size. This is equivalent to the capabilities of a 100x100 mesh screen. The filters shall be of the back-flushing or

cartridge type provided with a means of cleaning without disconnecting the piping. If the cartridge type is used, a sufficient quantity of cartridges shall be on hand at the filter location. COMPANY is privileged to examine the filter at any time deemed necessary. A meter of sufficient size and accuracy shall be used to measure the quantity of fill water pumped into the pipe for any period. If water is transferred from one section to another, CONTRACTOR shall install a filter and meter between sections as directed by COMPANY Representative.

#### 14.3. PIPE CLEANING

Each section to be tested shall be cleaned by blowing with air a wire brush type pig, or pigs, a sufficient number of times to clean any rust, scale, slag, dirt or other debris which may be in the pipeline. After this operation, the CONTRACTOR shall clean the pipeline using compressed air to propel a cleaning pig. In front of the cleaning pig there shall be approximately 200 feet of clean water. The cleaning pig shall be run through each test section until each section has been cleaned to the satisfaction of the COMPANY Representative prior to filling the pipeline with water for testing.

During at least one run of the cleaning pig, a sizing plate will be attached to it. The sizing plate's diameter will be 95% of the smallest inside diameter through which it will pass, as given in EXHIBIT K HYDROTEST PRESSURES. The sizing plate will be made of aluminum and supplied by CONTRACTOR. Before running the sizing plate, CONTRACTOR shall replace the sizing plate, if, in the opinion of the COMPANY Representative, it is damaged. If the sizing plate "hangs up" in the line, it is the CONTRACTOR'S responsibility to find and remove it from the line, then repair whatever restricted its passage. After such repairs are made, CONTRACTOR shall rerun the sizing plate until complete passage is obtained. The sizing plate will be run through the pipelines before and after hydro testing.

CONTRACTOR shall furnish and install pumping equipment, filter, valves, piping, blinds, and other materials as required to fill the test section with water. A scraper (furnished by CONTRACTOR) shall be run ahead of the water to displace all entrapped air from the line. Water shall be furnished by COMPANY.

#### 14.4. HYDROSTATIC LEAK TEST

The hydrostatic leak test includes:

- a. Submitting a detailed test procedure for approval.
- b. Filling the test section with water from the low end. If required by COMPANY Representative or these SPECIFICATIONS, DRAWINGS, or SCOPE OF WORK chemicals shall be added to prevent biological growth or corrosion.
- c. Performing the test at the specified pressure, investigating any leaks or breaks, and making any necessary repairs or replacements.
- d. Performing the tie-in of the tested sections.

- e. Recording all test data.

CONTRACTOR shall isolate the test sections by installing test manifolds and installing the necessary piping connecting the test sections to allow passage of test water from one section to another. Where directed by COMPANY, the test water shall be strained, filtered and metered when passing from one section to another.

COMPANY will inspect the testing operations, determine the acceptability of the test and witness the validity of the test results.

CONTRACTOR shall be responsible for protecting all the exposed piping from freezing during freezing weather at test manifolds, valve settings, and take-offs. CONTRACTOR shall be responsible for protection against over pressuring due to temperature and neglect. All valves will be left open and plugged or blinded.

Temperature recordings shall be made continuously during the filling, pressuring, and testing operations.

After the filling operation has been completed, blind flanges and bull plugs shall be installed on all connections which are not being utilized for pressure gauge connections or dead-weight gauge connections. All valves connected to the test section (with the exception of those on the test tree) shall be placed in a half open position before pressurizing the test segment.

Pressure equipment shall be independent of fill equipment. The pressure pump shall have variable speed and be capable of pumping a minimum of 5 gallons per minute at 300 psi. Pump surges will not be permitted during pressurizing.

All test sections designated to be hydrostatically tested shall be tested by the CONTRACTOR in accordance with the following paragraphs unless otherwise noted herein.

After the filling operations, CONTRACTOR shall perform the following.

- a. The temperature of the injected water shall be recorded. The pressure shall be increased to 50% of the test pressure and held for fifteen (15) minutes.
- b. The pressure shall then be increased to 80% of the test pressure and held for 2 hours.
- c. The pressure shall then be increased to 100% of the test pressure and held for 8 hours, or the duration specified in EXHIBIT K, PERMITS.
- d. If the pressure falls below the minimum test pressure at the high elevation point in the test section, the test section shall be re-pressurized. The amount of water injected shall be recorded, as well as the temperature of the injected water and the pressure before and after pressurization.
- e. If the pressure rises above the maximum test pressure at the low point in the test section, the test pressure will be bled off. The amount of water bled off will be

recorded, as well as the water temperature and the pressure before and after re-pressurization.

Maximum and minimum test pressures are shown in EXHIBIT K HYDROTEST PRESSURES, for the specified test location.

Should a significant drop in pressure, which cannot be attributed to changes in temperature, occur during the hold period, then CONTRACTOR shall locate and repair the leak(s). After repairs have been made, the 8 hour leak test shall be repeated until it has been determined acceptable.

No test section shall be judged acceptable until an 8 hour minimum period can be recorded without pressure loss or gain not correlated to temperature change. The test shall be accepted upon proof of no leakage.

During the testing operations, personnel will be available who are capable of operating, maintaining and calibrating all instrumentation which can be field calibrated. All instrumentation shall be available to CONTRACTOR for inspection and approval a minimum of one week before using on the first test section. The instrumentation shall be tested and calibrated, if necessary, before use on each test section. If instrumentation is found to be inaccurate during or after any test, COMPANY may require the test to be repeated.

#### 14.5. FAILURES

CONTRACTOR shall remove a minimum of 2 feet of pipe from each side of failures. The piece(s) removed shall be marked for orientation with respect to the position of the pipelines and with the approximate pipeline station location of the failure. CONTRACTOR shall not cut on or damage the failed edge of the pipe during removal, transit or unloading at the storage location. If the failed portion is too long for transport or hauling, it may be cut at right angles to the failure edge. All portions are to be retained. The failure shall be photographed before and after removal from the pipeline if possible.

Care must be taken to ensure that backfilling, at repair sites, is carried out in accordance with the SPECIFICATIONS.

Upon completion of the pipe repair, CONTRACTOR may, at COMPANY's discretion, be required to displace the test section volume with fill water behind a fill pig to remove all entrapped air.

COMPANY shall bear all costs for repairs and the replacement of all damaged materials and installations resulting from test failures attributable to defective material furnished by COMPANY. CONTRACTOR shall furnish all labor and equipment to make such repairs on replacement and COMPANY will reimburse CONTRACTOR for the labor and equipment required at the rates given in EXHIBIT B, PRICE SCHEDULE, Section C.

CONTRACTOR shall bear all costs of repairs and the replacement of all damaged materials and installations resulting from test failures attributable to negligence of the CONTRACTOR, inferior workmanship by CONTRACTOR, and defective or inadequate materials or equipment furnished by CONTRACTOR.

#### 14.6. DEWATER

After acceptance of the hydrostatic leak test, the pressure shall be bled down at an even rate of water discharge until atmospheric pressure is reached. Reduction of pressure shall be conducted over a time period no shorter than 15 minutes in length and in such a manner as to not develop severe vibrations.

Caution shall be used to prevent air lock within the test section to be dewatered. A section should not be allowed to free drain.

Gas lines shall be dewatered by a minimum of 3 dewatering pig runs or until the line is completely dewatered. Dewatered shall be defined as 1/4 inch of water penetration in a foam pig.

CONTRACTOR shall be responsible for disposing of test water. The method of disposal shall be proposed by CONTRACTOR in a written procedure, including provisions for erosion control, and are subject to approval by COMPANY.

#### 14.7. TIE-INS

Tie-ins shall be made after the successful test of a test section. All tie-in welds will be radiographically inspected before backfilling by CONTRACTOR.

Tie-ins or tested sections containing fill water for sections to be subsequently tested shall not be made in cases where excessive air, entrapped as a result of the tie-ins, will be injected into the section to be tested.

Note that in many cases the loss of water at tie-ins will be considerable. In such cases this water shall not be allowed to flow into running streams, rivers or wells which are used for domestic water supplies. The water shall not be allowed to erode drainage channels in the terrain or damage existing levies, banks and earth works. Care shall be taken to ensure that this water is directed (by the use of temporary piping, if necessary) into natural depressions, CONTRACTOR constructed tanks or similar formations. Spraying through fine nozzles onto shallow sloping or flat ground may also be acceptable. The method of water disposal shall be approved by COMPANY, the landowner and the applicable governmental authorities.

Backfilling at the tie-in sites shall be carried out in accordance with the SPECIFICATIONS.

#### 14.8. INHIBITOR INJECTION (Not included in this WORK)

After the accepted completion of all Testing, Dewatering and Tie-ins the CONTRACTOR shall inject a corrosion inhibitor into the pipeline. COMPANY shall furnish the corrosion inhibitors. The amount of corrosion inhibitor to be injected will be determined at the time the test sections are complete. The procedure to inject the corrosion inhibitor is:

- a. Inject a volume of inhibitor equal to 100 feet of pipeline length.
- b. Launch a 4 cup scraper pig.
- c. Launch a second 4 cup scraper pig.
- d. Using compressed air propel the inhibitor and the scrapers to the other end of the pipeline system.

#### 14.9. SAFETY AND COMMUNICATIONS

CONTRACTOR shall take all necessary precautions in testing the pipeline and its appurtenances to protect the public and employees. Only personnel associated with the testing activities shall be allowed in the general vicinity of the testing operations.

Radio communications shall be provided by CONTRACTOR to properly control and coordinate all phases of testing. COMPANY will be provided with CONTRACTOR radios to maintain communications.

Static electricity charges may be generated on Polyethylene pipe by friction, particularly during the handling of pipe in storage, shipping, installation, and pigging operations. The flow of air or gas containing dust may also build up significant static charges during the cleaning and drying operations. These charges may be a safety hazard, particularly in areas where there is leaking gas, or an explosive atmosphere.

Polyethylene pipe is a non-conductor of electricity, and the static charge will remain in place until some grounding device comes close enough to allow it to discharge.

The discharge of these static electric charges generally happen when workmen touch the pipe themselves, or upon application of mechanical tools to the pipe. The result of the discharge will vary from an insignificant physical shock to possible ignition of a flammable gas-air mixture. The most effective and simple method to minimize the hazard of the discharge is to apply a film of water to the work surface, to drain away the static electricity. A ground wire on the plastic pipe will only discharge from that point, since the plastic is a non-conductor.

When workmen must enter a bell hole to work on or make repairs to a damaged or leaking test section, it is important that all safety precautions be observed. The exposed working surface of the plastic line should be doused with water before entering the area, and a wet cloth should be kept on the pipe to drain off static charge build up while working on the line.

## 15. WATER BODY, STREAM, AND DITCH CROSSINGS

### 15.1. WATER CROSSING

CONTRACTOR shall construct the pipeline across drainage ditches, arroyos, creeks, streams, canals, rivers and adjacent lowlands, and flood plains. Unless specifically agreed otherwise, no extra payment will be made to CONTRACTOR by COMPANY for such ditches, creeks and rivers. Such crossings are to be considered as part of the WORK.

#### 15.1.1. Ditch

All crossings are to be open cut unless Right of Way stipulations require boring. The ditch for the pipeline shall be excavated to a width on the bottom of at least 30 inches greater than the O.D. of the pipe (including the coating) to be placed therein and shall be deep enough to provide cover as shown on the DRAWINGS or as directed by COMPANY. If more than one pipe is laid in the same ditch, the width shall be at least 36 inches greater than the sum of the diameters. It is the intent of these specifications to require the CONTRACTOR to generally lay the pipe horizontally throughout the bed of the stream and at a depth such that high water will not affect the pipe by reason of the scouring action of the stream. Particular attention will be given the location of the sag bends so as to see that they are located in the bank beyond any point affected by a change in the stream bank. In general, this shall be considered to be 50 feet back from the high edge of the bank, unless prevailing conditions indicate otherwise.

#### 15.1.2. Installation

CONTRACTOR shall conduct operations so as not to hinder the water flow:

The gradient of the stream bed shall be maintained by not leaving spoil banks of excavated material or other objects in the stream bed.

Stream banks shall be restored to the original grade and cleared of foreign objects.

Sand-cement sack breakers or rip-rap as specified shall be placed as directed by COMPANY to protect the banks and pipeline.

CONTRACTOR may choose with prior approval, his method of crossing with a plan of excavation, pipe laying, and installation of the pipe. COMPANY may reject or approve such a plan.

15.1.3. Pulling or Pushing

When the line is pulled or pushed across river and stream crossings where there is rock or other sharp objects, rock shield shall be placed on the pipe to protect the coating, such protective material to be furnished by COMPANY and installed by the CONTRACTOR.

15.1.4. Water Fill

The CONTRACTOR will be allowed to fill the river crossing line with filtered water to sink the pipe where concrete coated pipe is not laid, with the stipulation that, after installing the crossing (and placing anchor weights if required) COMPANY will not require immediate removal of such water. All sections of the line to be placed in the river crossing as well as road and railroad crossings shall be water tested for 4 hours at 90% of SMYS before installing the crossing. Test pressures are given in EXHIBIT K HYDROTEST PRESSURES.

15.1.5. Weights and Anchors (details will be supplemental)

Sections of the line laid across lakes, washes, rivers, and waterways shall be weighted or anchored as specified by COMPANY. CONTRACTOR shall furnish all materials and equipment, including weight and anchors except as specified to be furnished by COMPANY in EXHIBIT F COMPANY-FURNISHED MATERIALS. CONTRACTOR shall do all WORK necessary to transport, string and install weights and anchors at locations and in the manner designated by COMPANY.

Several thicknesses of rock shield shall be placed between the pipe and each weight. Where weights are installed on long sections of pipe, care shall be taken in handling to prevent buckling of the pipe.

Pipeline anchors will be installed in accordance with manufacturer's specifications. During installation, every precaution shall be taken to prevent damage to the pipe and coating.

15.1.6. Buoys

If buoys are required to float the pipe during installation, they shall be installed so as not to damage the pipe and pipe coating.

15.1.7. Cover

Unless specified in the DRAWINGS, the minimum cover between the top of the pipe and the bottom of the waterway shall be 60 inches.

## 15.2. ROAD AND RAILWAY CROSSINGS

CONTRACTOR shall do all WORK necessary to haul and string, excavate, bore or cut and install pipe and casing under highways (and other public or private roads) and railways, and to backfill and repair such excavation. Unless specifically agreed otherwise, no extra payment will be made to CONTRACTOR for such crossings which are considered part of the WORK. CONTRACTOR shall furnish all materials and equipment except as specified in EXHIBIT F COMPANY-FURNISHED MATERIALS as furnished by COMPANY.

### 15.2.1. Approval

COMPANY shall procure easement permits for the highway and railway crossings, but CONTRACTOR shall perform no excavation on the highway or railroad Right of Way without approval by COMPANY. CONTRACTOR shall review all permits and know all of the requirements and restrictions of crossing permits and shall conduct the WORK in strict accordance with such requirements and restriction, including notification of highway and railway representatives. CONTRACTOR shall not cut into any highway or road surface of concrete, asphalt, gravel, oil or any binding material without written permission from the authority under whose jurisdiction the permit is issued.

### 15.2.2. Highway or County Road Boring

Boring shall be done from pits located a minimum of 30 feet from the edge of pavement on fully access-controlled highways and at a distance of 10 feet plus the depth of pit without shoring on conventional highways. If shoring is used, the pits shall be located at a minimum of 10 feet from the pavement on conventional highways. Such shoring shall be installed immediately after excavation of the pit and it shall be constructed and maintained so that it will safely support all vertical and lateral loads which may be imposed upon it during the boring operation.

Pits for boring shall be excavated no more than 48 hours in advance of boring operations and backfilled within 48 hours of boring operation completion. Pits must be graded and sloped per applicable regulations, permit requirements, and the SPECIFICATIONS. All roads used must be cleaned up and restored.

### 15.2.3. State and County Road Crossing

State of North Dakota Highways and County Roads shall be bored.

### 15.2.4. Temporary Bridges

Where permission is granted to the CONTRACTOR to cut the surface of a road, CONTRACTOR shall erect barricades and post warnings to prevent

injury or damage because of traffic on such road. CONTRACTOR shall furnish a flagman if required by the local authorities or the permit. CONTRACTOR shall in all cases where a ditch has been cut across public or private roads, install substantial temporary bridge work the full width of the road, of adequate strength and properly constructed to insure safety of traffic. CONTRACTOR may, however, instead of bridging, backfill the ditch the full width of the road when specifically permitted to do so by COMPANY.

15.2.5. Backfill

Where the surface of a road has been cut to install pipe or casing, the CONTRACTOR shall provide sand and crushed rock suitable for backfill. The backfill shall be tamped in 6-inch layers to 95% Standard Proctor Density. The cycle shall then be repeated until the entire ditch has been backfilled. CONTRACTOR shall furnish and haul water to wet the backfill, if directed by COMPANY, in order to get the proper degree of compaction.

15.2.6. Casing

Casing for all crossings where required shall be welded into one continuous length and need not be coated. If split casing is used the longitudinal weld seams of the casing shall be installed so that the seams are located on the sides. The ends of the casing pipe to be welded shall be accurately aligned to prevent Hi-Low. All girth welds shall be internally inspected and if Hi-Low exists, it shall be ground smooth. The pipe to be installed within the casing shall be coated as specified on the DRAWINGS and/or Purchase Order. Before placing pipe in casing, insulators shall be installed. Adequate provisions must be made to ensure that insulators are firmly attached to the carrier pipe so as not to allow the insulators to move when placing the carrier pipe inside of the casing. After casing and pipe have been installed under the highway or railroad, the casing end support shall be installed and then the space between the pipe and casing shall be sealed at each end with a casing seal. Vent pipes shall be welded into the casing and extended underground to the Right of Way line of the highway or railroad unless otherwise required.

15.2.7. Support

Where the casing pipe is above the level of the excavated ditch, the carrier pipe shall be supported at a maximum of 8 foot intervals with sacks filled with 1:3 cement and from end of casing to the point where pipe rests firmly in the bottom of the ditch. This placement of sacks is to be at CONTRACTOR'S expense.

15.2.8. Safety

CONTRACTOR shall provide and maintain in a safe condition temporary approaches and crossings of public roads, private roads, and entrances which may be opened for construction. CONTRACTOR shall comply with any city, county, or state regulations as to placing danger signals and flares.

In the absence of such regulations, CONTRACTOR shall place danger signs visible during daylight and darkness, and lanterns or flashers at the actual crossing or boring excavation. Signs shall also be placed 300 feet in each direction from the crossing. Danger signs must be readable at 100 feet and lanterns and flares shall be kept burning from 30 minutes before sundown until 30 minutes after sunrise. If barricades or guard rails are necessary and the CONTRACTOR has not already placed same, the CONTRACTOR shall provide such barricades and guard rails at no additional cost to COMPANY.

15.2.9. Insulators and End Seals

Insulators and end seals shall be installed by CONTRACTOR so as not to damage the pipe coating.

15.2.10. Cover

Unless otherwise specified in EXHIBIT E DRAWINGS, the minimum cover between top of the pipe and the bottom of the drainage ditch and road bed shall be 60 inches.

15.2.11. Final Acceptance

Before final acceptance of the crossing installation COMPANY, all casings shall be electrically insulated from the carrier pipe. All WORK must be acceptable to COMPANY and to applicable regulatory body. An acceptable means to check for insulation is to use an ohmmeter to make a resistance measurement between the casing pipe and carrier pipe. If there is contact between the pipes the resistance indicator will be essentially zero.

15.3. TEST LEADS

CONTRACTOR shall install test lead assemblies at all road and railroad crossings, insulated flange installations, foreign pipeline or other structure crossings, and at convenient intermediate locations along the Right of Way so as to maintain approximately one mile maximum spacing between test lead assemblies.

All connections to the casing shall be firmly Cadwelded or fastened to give a good electrical bond.

15.3.1. Foreign Pipeline Crossings

Unless otherwise noted (normally in EXHIBIT I, Right of Way) COMPANY shall obtain approval of the owner of any foreign pipeline for the installation of test leads on the foreign line. CONTRACTOR shall, upon receipt of COMPANY'S and the foreign pipeline owner's approval, install test leads on the foreign line and repair the coating to the COMPANY's satisfaction.

15.3.2. Installation

Installation must be in accordance with DRAWINGS listed in EXHIBIT E.

An exposure, approximately 4 inches square, shall be made on the top of the pipeline to which the lead cable is to be attached. The exposure shall be thoroughly cleaned to bare metal by a combination of wire brushing and filing.

Connections to the pipeline shall be made with a Cadweld TB-3 welder and an M-108 mold using No. 15 Cadweld cartridges. Cadweld copper sleeves No. 26180 shall be used when wire sizes of No. 10 AWG or smaller are to be used. A Royston "Handycap" (or COMPANY approved equal) coating shall be applied to the exposed pipe and Cadweld. The "Handycap" will then be protected with pipe tape.

Enough looping or slack must be provided to prevent test leads from being unduly stressed or broken during backfilling.

Methods of bond to the buried metallic structure and terminal box installations shall be in accordance with DRAWINGS and shall be approved by the COMPANY Representative.

CONTRACTOR shall verify each lead is connected to the pipeline by continuity testing. These tests shall be witnessed by a COMPANY Representative. Any leads found defective will be repaired or replaced at CONTRACTOR'S expense.

16. HOT TAPS (Not included in this WORK)

If WORK involves Hot Taps, COMPANY will provide ATTACHMENT 4 HOT TAPS for more details and requirements.

17. CLEAN UP

CONTRACTOR shall clear the Right of Way and its surrounding ground, and shall at COMPANY direction, dispose of all waste materials, debris, and extra pipe remaining from his operations. CONTRACTOR shall not conduct clean-up of the Right of Way in a

sporadic manner. Clean-up shall be continuous and will be inspected by COMPANY accordingly. CONTRACTOR shall fill and smooth over holes and ruts and shall repair all miscellaneous and unclassified ground damage done by CONTRACTOR, and shall restore the ground to such stable and usable condition as may reasonably be required consistent with the condition of the ground before the building of the facilities.

Right of Way clean-up may be hindered by either weather or special stipulations of the Right of Way. COMPANY may elect to shut down such operations until conditions improve.

Clean up shall also comply with any stipulations in landowner agreements.

18. SEEDING

Seeding of Right of Way will be by CONTRACTOR after restoration is complete. Agricultural land and ROW land each have a different, specified seed mixture. Seed mixture specifications will be provided by COMPANY in the Description of WORK document. CONTRACTOR shall provide seed.

Compacted areas shall be ripped to a depth of 18 inches and disked to a depth of 6 inches before seeding. Seeding shall be done with a disk-type drill having two boxes for various seed sizes. The drill rows shall be 8 to 10 inches apart. The seed shall be planted at not less than 1/2-inch deep or more than 1 inch deep. The seeder shall be followed with a drag, packer, or roller to ensure uniform coverage of the seed, and compaction. Drilling shall be done on the contour where possible, not up and down the slope.

Where slopes are too steep for contour drilling, a "cyclone" hand seeder or similar broadcast seeder shall be used. Seed shall then be covered to the depth prescribed above, by whatever means is practical, i.e., hand raked. If the seed is not covered, the prescribed seed mixture amount will be doubled.

19. INSTRUMENTATION AND ELECTRICAL (Not included in this WORK)

19.1. If WORK involves Instrumentation or Electrical, COMPANY will provide ATTACHMENT 5 INSTRUMENTATION AND ELECTRICAL for more details.

20. INSULATION AND HEAT TRACE (Not included in this WORK)

20.1. If WORK involves Insulation and Heat Trace, COMPANY will provide ATTACHMENT 6 INSULATION AND HEAT TRACE for more details

21. SAFETY, HEALTH, AND LOSS PREVENTION REQUIREMENTS

The safety and health objectives for the COMPANY and all WORK undertaken are zero OSHA Recordable Injuries to people working on the Project, no property damage, and

protection of the public safety. CONTRACTOR shall actively and adequately promote safe working conditions.

CONTRACTOR shall have a Safety Plan and Safety Rule/Procedures Manual/Book that is applicable to the WORK. The CONTRACTOR Safety Plan and Safety Rules/Procedures shall comply with applicable provisions of OSHA General Industry Standards 1910, Construction Standards 1926, and Process Safety Management Standard 1910.119.

Compliance with applicable Federal and State Pipeline Safety Regulations and OSHA safety rules, procedures, and regulations, and COMPANY Safety Programs and Safety Rules is required. Failure to do so will result in immediate discontinuation of any or all parts of the WORK which are in violation until compliance is achieved.

CONTRACTOR is fully responsible for compliance with Safety Regulations, Rules, and Safe Work Processes and Procedures. COMPANY procedures for certain safety-related or other activities and procedures for the WORK are not a substitute nor do they relieve CONTRACTOR of his responsibility and compliance with Safety Regulations or for CONTRACTOR providing and implementing his own procedures and processes. Examples include, but are not limited to Lock Out/Tag Out, Hot Work, Confined Space Entry, MSDS, etc.

CONTRACTOR shall fully cooperate with the police, COMPANY personnel, fire chief, and COMPANY Representative when requested to alter his operations during times of emergency or to achieve compliance with safety regulations, rules and good practices.

#### 21.1. ACCIDENT AND INCIDENT REPORTING AND INVESTIGATION

CONTRACTOR shall immediately report all accidents/incidents and near misses and any injury and property damage to the COMPANY Representative and the COMPANY HSE Representative. If required, the CONTRACTOR shall notify the applicable regulatory agency within the required reporting requirements.

The CONTRACTOR shall investigate all accidents/incidents that result in, or have the potential to result in injury or illness, property damage, process/product loss or harm to the environment. The investigative process must include available witness statements, permits and JHAs pertinent to the work, and the identification of root causes or causal factors that contributed to the occurrence. The CONTRACTOR must determine the necessary corrective actions and ensure closure/completion in timely manner. In addition to the CONTRACTOR'S investigation and analysis, the COMPANY retains the right to conduct their own investigation for any illnesses, injuries, fatalities, incidents or near misses occurring on its premises or as part of the WORK.

After the CONTRACTOR has made its immediate notification of the accident/incident or near miss to the COMPANY Representative and COMPANY

HSE Representative, if the COMPANY advises the CONTRACTOR that the COMPANY will make its own investigation, then:

- The scene of the incident/accident must be preserved (untouched or altered) and
- Any tools and/or equipment must stay at the scene, unless an unsafe condition is present

until the COMPANY conducts its own investigation.

The CONTRACTOR shall submit a copy of a written report and investigation to the COMPANY Representative, unless otherwise specified, within 48 hours of occurrence.

## 21.2. ALCOHOL, ILLEGAL DRUGS, AND FIREARMS

### 21.2.1. Prohibited Items

Alcohol, illegal drugs, and firearms are prohibited on COMPANY property and in areas of the WORK.

### 21.2.2. CONTRACTOR Programs and Requirements

CONTRACTOR shall develop, as necessary, and enforce a policy that prohibits the possession, distribution, promotion, sale, use, and abuse of illegal drugs, drug paraphernalia, controlled substances, alcoholic beverages, and weapons while on COMPANY premises, or in areas of the WORK. CONTRACTOR and Guests, regardless of whether or not licensed to do so, may not carry or transport any firearm or weapon, whether or not concealed, at the workplace, on any COMPANIES' owned or leased premises, including rights-of-way and easements, COMPANIES'-owned vehicle, or in any other vehicle while engaged in COMPANIES' business.

Based on the COMPANY business unit or regulatory requirements the CONTRACTOR shall establish and maintain acceptable Anti-Drug and Alcohol Misuse Programs.

CONTRACTOR programs shall include post-incident testing criteria.

If testing is conducted based upon suspicion, the CONTRACTOR employee under suspicion shall be removed from service pending testing results.

## 21.3. SAFETY RULES AND PROCEDURES

The CONTRACTOR shall submit their company Construction Safety Plan and Safety Rules/Procedures Manual/Book to the COMPANY for approval. Upon a successful review and/or any agreed-to modifications to the CONTRACTOR'S Safety

Plan/Manual and upon receipt of written approval from the COMPANY, the CONTRACTOR'S Safety Plan and Safety Manual, along with the safety and health provisions of these SPECIFICATIONS and applicable Federal, State, and Local Regulations, shall become the Safety Rules and Procedures applicable to the WORK.

The CONTRACTOR shall provide 5 copies of the agreed-to Project's Safe Work Plan and Safety Rules Manual to the COMPANY within 7 days after the CONTRACTOR receives written approval for these documents from the COMPANY.

21.3.1. Jobsite Hazard Awareness and Mitigation

The CONTRACTOR shall familiarize himself with the area and operating units bordering the jobsite and the hazards which might be encountered.

CONTRACTOR shall take all reasonable precautions to protect the workmen and the public and shall provide, where reasonable and necessary, barriers, guards, temporary bridges, lights, and watchmen.

21.3.2. Job Hazard Analysis Process

A job task safety planning, risk evaluation, and hazard mitigation process, e.g., Job Hazard Analysis (JHA) Procedure, shall be utilized for the WORK. An example of an appropriate JHA form is found in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION. This COMPANY JHA form may be used or the CONTRACTOR may use his own JHA form provided it contains similar information and procedures, and after a review and upon written approval from the COMPANY.

CONTRACTOR personnel shall complete a Job Hazard Analysis (JHA) before beginning any WORK. The JHA shall consist of a review of COMPANY and CONTRACTOR safe work policies and procedures, required permits, PPE, emergency response, and specific work hazards, risks, mitigation, and special requirements of job tasks. As a minimum, a JHA shall be completed at the beginning of the work shift and during the shift whenever there is a material change in job scope. The CONTRACTOR shall insure that all SUBCONTRACTORS used on the job also complete a JHA or are included in the JHA process.

21.3.3. HSSE Observation Card / Near Misses

An HSSE Observation is a safety intervention process for the purpose of providing constructive feedback to a worker(s). The HSSE Observation can be conducted by any COMPANY or CONTRACTOR employee. The intention of a safety observation via the HSSE Observation Card is to provide input without the threat of repercussion from management. HSSE Cards are exempt from line management reporting protocols. The

objective is to keep feedback constructive and in the mode of continual improvement. Positive comments may be made for exceptional risk mitigation or exceptional safety focus. HSSE Observation cards can be found in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION.

The name of the individual who is receiving the coaching or comment is not included on the HSSE Card, but the name of the initiator is. Cards shall be mailed or e-mailed to the COMPANY as indicated below. The COMPANY shall use the cards to identify safe work trends to allow targeted training or other improvements. Individuals productively engaged and proactively utilizing the HSSE Observation program will be recognized and appropriately rewarded as this is a key part of the COMPANY'S safety improvement process.

Completed Cards should be submitted to:

Attention: Brenda Fulkrod

Via e-mail at [bfulkrod@sbpipeline.com](mailto:bfulkrod@sbpipeline.com), or

U.S. Mail at Saddle Butte Pipeline, 858 Main Ave, Suite 301,  
Durango, CO 81301

21.3.4: Pre-Construction / Job Safety Meetings

Prior to beginning the WORK a Pre-Construction safety meeting shall be held between the COMPANY and CONTRACTOR and SUB-CONTRACTORS. The typical Agenda for this meeting, including topics and job expectations and requirements, is located in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION of this EXHIBIT.

All CONTRACTORS and SUBCONTRACTORS shall attend COMPANY safety meetings when requested.

The CONTRACTOR shall conduct weekly safety meetings for all of his personnel. Minutes of these meetings shall be prepared by the CONTRACTOR and furnished to COMPANY. COMPANY has the option to attend these meetings and present topics of mutual interest.

21.3.5: Personal Protective Equipment (PPE)

The CONTRACTOR shall provide all required PPE to their workers. The minimum required for all personnel working on the Project includes: hard hats, safety glasses with side shields, and safety toed shoes (steel toed, leather shoes or boots).

- Eye and Face Protection must comply with ANSI Z87.1 (OSHA 1910.133 Eyes and Face Protection).

- Head protection must comply with ANSI Z89.1 (OSHA 1910.135 Head Protection).
- Foot protection shall comply with ASTM F2413-05.
- Sleeved shirt covering half the upper arm and full length trousers, preferred cloth is cotton or wool.

Additional PPE shall be worn as determined by job task and shall be detailed on the daily or work task JSA.

The following shall be used as guidelines or as mandatory when required by regulations or written job procedure and safety rules:

- Hearing protection must be worn in posted areas and/or during operations that generate noise in excess of 85 dba (OSHA 1910.95 Noise Exposure).
- Fire Rated Clothing (FRC) shall be worn in posted areas, areas containing equipment and piping in hydrocarbon service, and working involving flammable products.
- Gloves.
- Fall Protection, including a Personal Fall Arrest System or Fall Prevention System for tasks that fall under OSHA standards, e.g., 1926.501 and 1901.23.

PIPE shall be appropriate for the task being performed and in good condition. It shall be inspected prior to each use as per the MANUFACTURER's recommendations and properly sized to the fit the worker. In the event the PPE is damaged, it shall be properly disposed of, repaired, or replaced.

Jewelry, rings, wrist watches, loose clothing, unsecured long hair and loose accessories shall not be allowed within arm's reach of machinery, tools, electrical gear or locations where loose items present a hazard. (Note: Exceptions shall be documented on the JHA).

#### 21.4. SIMULTANEOUS OPERATIONS (SIMOPS)

Work activities that are ongoing in close proximity to one another or working far away but on the same system have the potential to create its own set of hazards. If work activities do correspond, special efforts need to be taken to ensure the safety of all parties is considered. These types of work activities include but are not limited to: lifting loads in congested areas, working in two vessels at the same time that have manways adjacent to one another, running air movers for multiple confined space entries off of one air compressors, positioning equipment or sand blasting activities near confined space entries, and lifting in general.

## 21.5. WORKING PERMITS

### 21.5.1. Safe Work Permits

Daily COMPANY Safe Work Permits are not generally required for the WORK under this Project, except as noted herein and as may be dictated by the type of work to be performed during the Project or as determined by the COMPANY.

A One-Time Safe Work Permit shall be issued to the CONTRACTOR at the beginning of the Project, and is part of the Pre-Job Safety Meeting process.

A Daily Safe Work Permit or job specific Safe Work Permit shall be required for the following work or jobs.

- Work within Critical Plant Process Areas, areas with operating equipment, energized power lines and cable trays, energized electrical equipment, operating well sites, confined spaces, Restricted Areas, or areas otherwise defined by the COMPANY as requiring a Safe Work Permit.
- Work requiring a Hot Work Permit
- Work requiring a Confined Space Permit
- Work requiring Lock-Out/Tag-Out Permit
- Work requiring a Lifting Permit, i.e. Critical Lift

### 21.5.2. Hot Work Procedures and Permit

Hot Work is any work that involves the use of open flame or other sources of ignition with the potential to generate a spark, heat, or static electricity that could cause a fire or explosion.

In general, a Hot Work Permit is required before any hot work is performed within areas that are closer than 35 feet to an area where combustible or flammable vapors and materials are present. These areas include locations where flammable vapors or materials can be expected during an upset condition, areas where hydrocarbons are produced or vented or have the potential to vent (including process areas), compressor stations, LACT units, piping tie-ins to in-service systems, and similar situations.

Hot Work Permits will be issued by the COMPANY Representative to the CONTRACTOR. CONTRACTOR shall coordinate with COMPANY prior to commencing Hot Work. The CONTRACTOR performing Hot Work is responsible for the safe execution of assigned tasks. If an unsafe

condition or a potentially unsafe condition arises, work must be stopped and the condition reported to the COMPANY Representative.

Unless permitted by premise specific policies or rated for the hazardous area, non-intrinsically safe devices such as cell phones, computers, radios, lighting, or pagers shall not be allowed in the area.

The CONTRACTOR shall follow applicable JHA and Work Permit requirements before performing work.

The COMPANY Hot Work Procedure and Hot Work Permit form are in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION. This procedure and permit applies to Hot Work in the WORK.

#### 21.5.3. Confined Space Permit

A Confined Space Permit is required for work in a space that is large enough to physically enter and perform work, has limited or restricted means of entry or exit, and is not designed for continuous occupancy. This permit is intended to assure safe entry and work in confined space environments by authorized personnel and prohibit unauthorized or unintentional entry into a confined space.

The following are examples of confined spaces where a Confined Space Permit shall be required.

- Crawl spaces.
- Tanks.
- Valve vaults, boxes, pits, or excavations.
- Electrical vaults.
- Excavations (trenches) greater than 4 feet deep when there is a possibility that a hazardous atmosphere or an engulfment hazard could exist.

The CONTRACTOR shall follow applicable JHA and Work Permit requirements before performing work.

The COMPANY Confined Space Policy, Procedure, and Permit are in ATTACHMENT 7, SAFETY, HEALTH, AND LOSS PREVENTION. This procedure and permit applies to Confined Space Work on the Project or other work as designated by the COMPANY.

#### 21.5.4. Lock Out / Tag Out Permit

Guidelines and safeguards must be in place to protect COMPANY and CONTRACTOR personnel from unexpected startup or energy release.

CONTRACTOR shall Lock-Out and Tag-Out any energy isolating device when performing maintenance or service/repair of equipment.

CONTRACTOR shall review and understand COMPANY'S Lock-Out / Tag-Out Procedures and adhere to all warnings including:

- Unauthorized removal of Lock-Out / Tag-Out devices is prohibited.
- Unauthorized operation or servicing of equipment is prohibited.
- Only authorized workers may perform Log-Out / Tag-Out.

COMPANY Lock-Out / Tag-Out Procedures and Tag forms are in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION.

#### 21.5.5. Lifting Permit

A Lifting Permits shall be required for a Critical Lift and other lifting work as designated by the COMPANY or CONTRACTOR.

The Lifting and Critical Lift Permit, Checklist, and Procedure are in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION.

#### 21.6. MATERIAL SPECIFICATION DATA SHEETS (MSDS)

CONTRACTOR is responsible for providing MSDS to COMPANY for all hazardous chemicals they bring to a COMPANY worksite. If a CONTRACTOR will be using a new chemical, CONTRACTOR MSDS specific procedure shall be followed prior to the purchase and arrival of the product on COMPANY-owned and controlled property.

The COMPANY shall determine if CONTRACTOR-provided chemicals shall require a formal COMPANY Management of Change (MOC) process/procedure prior to use on the Project. If a MOC process is required, CONTRACTOR shall fully cooperate with COMPANY in the MOC procedure and approval process.

The CONTRACTOR is responsible for confirming that its employees received training in compliance with the OSHA Hazard Communication Standard. CONTRACTOR shall verify that any hazardous chemical, as identified under the OSHA Hazard Communication Standard, supplied by the CONTRACTOR for WORK at COMPANY facilities is properly labeled in accordance with that regulation, and that current MSDSs for hazardous products are available for review at the site of CONTRACTOR'S WORK.

The COMPANY shall provide personnel with information about hazards that may be present in COMPANY facilities due to CONTRACTOR'S hazardous chemicals. The COMPANY HSE Coordinator/Manager will determine whether to enter CONTRACTOR'S MSDSs into the COMPANY database or insert into the local binder. If the materials are to be onsite for a short-term project only, and will be removed after the project, the reviewers may elect not to enter the documents into the

database binder. However, the CONTRACTOR shall maintain MSDSs on the jobsite for the duration of the project and all remaining product shall be removed from the project site at the end of the WORK.

## 21.7. SAFETY REQUIREMENTS FOR COMPANY OPERATING UNITS

WORK within certain COMPANY Operating Units shall comply with the COMPANY's Unit Specific Safety Execution Plan. These Unit Safety Execution Plans typically have the following attributes and requirements:

- Pre-Entry Plant Safety and Process Overview and Test
- Entry Authorization Procedure, including ID Card and hardhat sticker
- Facility Sign-In and Sign-Out
- Facility Alarm, Work Suspension, Assembly, and Evacuation Procedures
- Smoking, Eating Area, Cell Phone, and Radio Procedures/Restrictions
- Driving Safety Requirements
- Specialized or Job Specific Training Requirements
- Work Permit Procedures
- Process Safety Management (PSM) and Management of Change (MOC) procedures and requirements
- Material Safety Data Sheets (MSDS) procedures
- Barricading procedures
- Scaffolding procedures
- Weather work impacts and procedures
- Other Unit specific procedures

### 21.7.1. Little Missouri Plant

COMPANY's Little Missouri Plant has a Unit Safety Execution Plan. This Plan is available upon CONTRACTOR request.

Other than WORK-related meetings, no WORK under this SPECIFICATION is anticipated within this COMPANY Operating Unit.

### 21.7.2. COMPANY Operating Unit Work—Safety Execution Plans and Special Safety Requirements

The following Site-Specific Safety Requirements apply to the WORK and as shown in ATTACHMENT 7 SAFETY, HEALTH, AND LOSS PREVENTION:


Tie-ins to Well Sites and Well Site Equipment as shown on the DRAWINGS and as noted in the WORK. The Safety Requirements for these sites are typical of these SPECIFICATION requirements.

## ATTACHMENT 3

### Sections 10 & 11 of Exhibit D Pipeline Construction Specifications

#### Engineering Specifications and Manufacturer Data Sheets List

- Engineering Specification No. 03-101 Painting Specification for Structural Steel and Piping – Above Grade, Issue 24-Aug-11
- Engineering Specification No. 03-102 Coating Specification for Structural Steel and Piping – Below Grade, Issue 15-Feb-12
- Dupont Red E-Z Patch Stick, Product 7-1631S Technical Information Sheet
- Dupont Green E-Z Patch Stick, Product 7-1677S Technical Information Sheet
- Canusa-CPS K-60 Corrosion Protection Heat-Shrink Sleeve Product Data Sheet

	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11

**Painting Specification for Structural Steel and Piping - Above Grade**

**PART 1 – PAINT SYSTEMS**

**A. SUMMARY**

1. This specification includes but is not limited to:
  - a. Surface preparation and painting of exposed metal surfaces, including equipment, valve bodies and fittings.
  - b. Epoxy priming materials.
  - c. Urethane paint systems.
  - d. Paint colors

**B. CODES AND REFERENCES**

1. General: All references are to the latest publication as follows:
  - a. NACE: National Association of Corrosion Engineers.
  - b. SSPC: Steel Structures Painting Council.


**PART 2 – PRODUCTS**

**A. SUBMITTALS**

1. Epoxy Primer: Submit manufacturer data and application instructions for approval for paint materials not listed in Appendix A.
2. Urethane Paint: Submit manufacturer data and application instructions for paint materials not listed in Appendix A.
3. Material Safety Data Sheets (MSDS) shall be submitted for approval for all paint materials. MSDS documents shall be maintained at the work site for all paint, coating, and cleaning materials.

**B. MATERIALS**

1. Primer: 4-7 mils dry coat thickness, Sherwin Williams Dura-plate 235, or approved equal. See Appendix A for attached manufacturer’s product information.
2. Finish Coat: 2-4 mils dry coat thickness, Sherwin Williams Sherthane, or approved equal. See Appendix A for attached manufacturer’s product information.


 SADDLE BUTTE PIPELINE, LLC	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11

3. Paint colors are specified in Part 3, Section E of this specification.

### **PART 3 – EXECUTION**

#### **A. GENERAL**

1. Furnish skilled labor, supervision, equipment, tools, and materials to paint above grade piping, valves, fittings, appurtenant piping, vessels, tanks, equipment, structural steel, and other appurtenances in accordance with these specifications.
  
2. Ensure the following preparatory work is complete prior to application of paint system for above grade exposed metal surfaces or surfaces as specified by Saddle Butte.
  - a. All welding, installation of all valves, instruments, and equipment.
  
  - b. Weld x-ray testing and repairs.
  
  - c. Pipe hydrotesting and repairs of pipe, patching of leaks.
  
  - d. Adequately tape cover or otherwise cover surfaces, instruments, devices, and installations not indicated to be cleaned, abrasive blasted, or painted.
  
  - e. Verify that surfaces are clean and dry, with foreign material removed.
  
3. The following surfaces shall be protected from abrasive cleaning and surface preparation and shall not be painted, including overspray, unless otherwise specified: stainless tubing; instruments such as gauges, cases, stainless steel and glass surfaces; stainless steel valves; sight glasses; gasket surfaces, including flange gasket surfaces; valve stems; name plates and equipment tags; electrical junction boxes; control panels; galvanized conduits; ground and lighting rod connectors; plastic, fiberglass, and other non-metallic enclosures; concrete surfaces; masonry; galvanized structural steel; galvanized pipe and piping components; and rotating parts of machinery. All protective covers shall be removed at the conclusion of paint work and items shall be restored to original conditions. If equipment is damaged during coating, the equipment shall be replaced or repaired.
  
4. Deliver all paint to jobsite in original sealed containers, manufacturer's labels and tags intact. All containers are to remain unopened until paint is to be applied.
  
5. Paint application shall comply with and be in accordance to the manufacturer's product information and application bulletins as listed in Appendix A and this specification.


 SADDLE BUTTE PIPELINE, LLC	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11

## B. SURFACE PREPARATION

1. **Surface Preparation:** Before manual cleaning or blast cleaning, all oil or grease, including residues of wax or grease markers, shall be removed by solvent cleaning in accordance with SSPC – SP1. Suitable non-oily solvents or emulsion cleaners shall be used, and final washing shall be with clean solvent, or after emulsion cleaners with clean potable water. Pressure washing will be the preferred method of cleaning piping and facilities that were previously primed or coated at the factory and are to be finish coated on site. After washing, the surfaces are to be rubbed with sandpaper to roughen the surface of the factory applied coating prior to application of the finish coat.
2. Weld areas shall be given special attention for complete removal of welding flux residues, especially in pocket and crevasses. All sharp weld projection, weld splatter, rough surfaces, sharp edges, burrs, scabs, and slivers shall be removed. Sand blast all pipe and materials to be insulated to SSPC SP-10 “Near White” in accord with paint manufacturer’s recommendations. Blast materials shall provide profile recommended by paint manufacturer for adhesion of paint to pipe and components. Blast only that amount of pipe to be coated during the shift. Do not allow rust to form on prepared surfaces. Touch blast “flash rust” areas immediately prior to application of primer. Vendor shall re-blast all rusted pipe materials or pipe materials not painted during the shift.
3. Pipe provided with fusion-bonded epoxy (FBE) coating shall be blasted to remove FBE in areas to be painted. NOTE: Do not remove FBE in areas to be insulated.
4. Chemical surface preparation to be used only by written authorization of the Saddle Butte Representative, using approved materials and applications.

## C. CLEANING AND SANDBLASTING

1. All steel surfaces to be painted shall be prepared by dry abrasive blast cleaning in accordance with SSPC – SP6 (commercial) for epoxy primer. In areas where abrasive blast cleaning is prohibited, power tool cleaning in accordance with SSPC – SP3 shall be used.
2. Cleaning shall not be conducted on surfaces that are wet, or will be wet before priming.
3. Compressed air used for blast cleaning shall be free of all oil and moisture. Adequate oil and moisture separators shall be used with a final continuous drain separator located at the blasting machine. All mechanical and electrical equipment and surfaces not be sandblasted shall be protected from damage. Damage caused by sand will be repaired at no cost to Saddle Butte.

	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11


4. Blast cleaning abrasives used shall be SSPC specification grade blasting sand, fresh water washed, clean, bone dry, screened to 30 – 60 mesh U.S. Sieve Series, dust free high grade silica. Other approved specification grade abrasives such as crushed slag, crushed flint, steel grit (but not shot), aluminum oxide, or other special non-silica abrasives may be used if approved by Saddle Butte Representative.

Blast cleaning shall produce a uniform anchor pattern having a profile height of not less than 1.0 mil or more than 2.0 mils.

5. Before priming, the cleaned surfaces shall be brushed with clean brushes, blown off with oil and water free compressed air, or cleaned by vacuum to remove all traces of dust, blast products and abrasives from the surfaces and from corners, pockets, and crevices. Any traces of oil, grease, or smudges shall be completely removed by solvent cleaning. Any blast cleaned or power tool cleaned surfaces that become wet before priming or are not primed before any surface oxidation occurs shall be re-cleaned.

#### D. APPLICATION

1. **Mixing:** Before application, all paints shall be thoroughly mixed and stirred until all pigments and components are completely and uniformly dispersed; uniform pigment suspension shall be maintained during application by stirring.
2. Any paint and coating materials that have been contaminated by water, dirt, oil or any other foreign material including improper thinners, and any materials that have skinned, livered, thickened (except normal thickening of thixotropic materials), gelled, exceeded manufacturer's recommended pot life, or otherwise degrades shall be discarded and replaced.
3. **Priming:** Apply primer to areas immediately after blasting is complete in accordance with manufacturer's recommendations. Apply with sufficient wet mil thickness to provide 4.0 mils dry thickness. Do not apply during humid, dusty, or other environmental conditions that may be deleterious to paint. Before application of any coat of paint, the previously applied coat must be thoroughly dry or cured, free from dust, moisture, oil or other surface contamination, and be free from defects. See drying schedule within attached manufacturer's product information.
4. **Painting:** Prepare primed surface in accordance with manufacturer's instructions. Apply finish coat with sufficient wet mil thickness provide 2.0 – 4.0 mils dry thickness. Do not apply during humid, dusty, or other environmental conditions that may be deleterious to paint. Work paint into all crevices and pockets. Brush out all runs and sags.

	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11

5. Application: One full coat of primer shall be applied to clean surfaces in strict conformance with the paint manufacturer's instructions. The application of this coat shall provide a dry film thickness of 4.0 – 7.0 mils.

Before application of the finish coat, the cured primer coat shall be thoroughly inspected. Any primer coat that is contaminated, soft, powdery, crumbly, flaky, cracked or that can be abraded when scraped with the edge of a "silver" coin or that is stained by rusting of the underlying steel, shall be spot cleaned and reprimed in conformance with the foregoing specifications. Any areas or spots less than 2.0 mils thick shall have additional primer applied to provide the specified primer coat thickness. The repaired coat shall be inspected after curing and any defects repaired.

When the primer coat is clean and completely dry (see drying schedule within attached manufacturer's product information), the finish coat shall be applied to provide 2.0 mils dry film thickness. The combined primer and finished coating shall have a nominal dry film thickness of 6.0 mils minimum to 10 mils maximum.

Upon completion of painting, the Vendor shall remove all debris to the satisfaction of the Saddle Butte Representative. Vendor shall clear equipment, assembly, or site of loose mil scale or sand when directed by the Saddle Butte Representative.

**E. PAINT COLOR**

1. For Off-Reservation facilities:
  - a. Epoxy Prime / Undercoat – No color to be added, manufacturer's standard.
  - b. Urethane Top Coat:
 

Primary color selection shall be Carlsbad Canyon (2.5Y 6/2)\*. This primary color shall be used for all painting of Off-Reservation installations unless otherwise instructed by a Saddle Butte Representative


Secondary color shall be Shale Green (5Y 4/2)\*

The \* designates Munsell Soil Color Chart Number.
2. For On-Reservation facilities:
  - a. Epoxy Prime / Undercoat – No color to be added, manufacturer's standard.
  - b. Urethane Top Coat:
 

Color shall be specified by Saddle Butte Representative.

**F. QUALITY CONTROL**


1. Inspection: Saddle Butte Representative (or designated inspector) will perform the following inspections:

	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11

- a. Visual inspection during course of field applications to insure compliance with application instructions.
- b. Wet mil thickness testing and final dry mil thickness testing.

G. DISPOSAL OF WASTE MATERIALS

1. General: Clean up sand and all construction materials. Remove all debris and left over accessories from site as soon as painting work is completed.
2. Storage: Store paint rags or waste in covered metal containers at all times, with covers always in place, and remove from site periodically as directed.

 SADDLE BUTTE PIPELINE, LLC	Specification No	03 - 101
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 101
	Issue Date	24-Aug-11

**Appendix A – SBP Spec No. 03-101**

- A. Sherwin Williams Dura-Plate 235 Product Information (2 pages)
- B. Sherwin Williams Dura-Plate 235 Application Bulletin (2 pages)
- C. Sherwin Williams Sherthane 2k Urethane Product Information (2 pages)
- D. Sherwin Williams Sherthane 2k Urethane Application Bulletin (2 pages)



# Protective & Marine Coatings

# DURA-PLATE® 235 MULTI-PURPOSE EPOXY

PART A  
PART B

B67-235  
B67V235

SERIES COLORS  
HARDENER

Revised 12/10

## PRODUCT INFORMATION

4.67

### PRODUCT DESCRIPTION

Dura-Plate 235 Multi-Purpose Epoxy is a modified epoxy phenalkamine, formulated specifically for immersion and atmospheric service in marine and industrial environments. Dura-Plate 235 provides exceptional performance in corrosive environment, and can be applied at temperatures as low as 0°F (-18°C).

- Self-priming
- Low temperature application, 0°F (-18°C)
- Surface tolerant - damp surfaces
- Provides salt water and fresh water immersion resistance
- Approved as a primer per MIL-PRF-23236, Type V, Class 7, Grade C
- Outstanding application properties

### PRODUCT CHARACTERISTICS

<b>Finish:</b>	Semi-Gloss
<b>Color:</b>	Wide range of colors available
<b>Volume Solids:</b>	68% ± 2%, mixed
<b>Weight Solids:</b>	79% ± 2%, mixed
<b>VOC (EPA Method 24):</b>	Unreduced: <280 g/L; 2.33 lb/gal Reduced 10%: <327 g/L; 2.72 lb/gal
<b>Mix Ratio:</b>	4:1 by volume

### Recommended Spreading Rate per coat:

	Minimum	Maximum
<b>Wet mils (microns)</b>	<b>6.0</b> (150)	<b>12.0</b> (300)
<b>Dry mils (microns)</b>	<b>4.0*</b> (100)	<b>8.0*</b> (200)
<b>~Coverage sq ft/gal (m<sup>2</sup>/L)</b>	<b>136</b> (3.3)	<b>272</b> (6.6)
<b>Theoretical coverage sq ft/gal (m<sup>2</sup>/L) @ 1 mil / 25 microns dft</b>	<b>1088</b> (26.6)	

\*See Performance Tips section

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

### Drying Schedule @ 6.0 mils wet (150 microns):

	@ 0°F/-18°C	@ 40°F/4.5°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
<b>To touch:</b>	18 hours	3.5 hours	2 hours	20 minutes
<b>To handle:</b>	36 hours	12 hours	3.5 hours	40 minutes
<b>To recoat:</b>				
<b>minimum:</b>	36 hours	12 hours	3.5 hours	40 minutes
<b>maximum:</b>	6 months	6 months	6 months	6 months
<b>Cure to service:</b>	30 days	14 days	7 days	3 days

If maximum recoat time is exceeded, abrade surface before recoating.  
Drying time is temperature, humidity, and film thickness dependent.

<b>Pot Life:</b>	16 hours	8 hours	4 hours	1 hour
<b>Sweat-in-time:</b>	1 hour	30 minutes	15 minutes	5 minutes

<b>Shelf Life:</b>	Part A: 36 months, unopened Part B: 24 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C).
<b>Flash Point:</b>	116°F (47°C) PMCC, mixed
<b>Reducer/Clean Up:</b>	Reducer R7K104

### RECOMMENDED USES

- For use over prepared steel and masonry surfaces.
- Salt water and fresh water immersion resistance
  - Ballast tanks, offshore and marine structures
  - Bilges and wet void areas
  - Above- and below- water hull areas
  - Decks and superstructures
  - Water and waste water tanks
  - Acceptable for use with cathodic protection systems.
  - Dura-Plate 235 Black meets or exceeds the performance criteria of C-200; SSPC Paint 16; and Mil-P-23236B(SH) Type I or IV Class 2
  - Suitable for use in USDA inspected facilities
  - Conforms to MPI # 101

Note: Not for immersion service when tinted.

### PERFORMANCE CHARACTERISTICS

Substrate\*: Steel

Surface Preparation\*: SSPC-SP10/NACE 2

System Tested\*:

2 cts. Dura-Plate 235 @ 5.0 mils (125 microns) dft/ct

\*unless otherwise noted below

Test Name	Test Method	Results
<b>Abrasion Resistance</b>	ASTM D4060 CS17 wheel, 1000 cycles, 1 kg load	65 mg loss
<b>Adhesion</b>	ASTM D4541	850 psi
<b>Direct Impact Resistance</b>	ASTM D2794	10 in lb
<b>Dry Heat Resistance</b>	ASTM D2485	250°F (121°C)
<b>Moisture Condensation Resistance</b>	ASTM D4585, 100°F (38°C), 2000 hours	Rating 10 per ASTM D610 for rusting; Rating 10 per ASTM D714 for blistering
<b>Pencil Hardness</b>	ASTM D3363	H

### IMMERSION (Ambient temperature)

- Salt Water.....Recommended
- Fresh Water.....Recommended
- Ballast Tank Mix.....Recommended

Epoxy coatings may darken or yellow following application and curing.



# Protective & Marine Coatings

# DURA-PLATE® 235 MULTI-PURPOSE EPOXY

**PART A**      **B67-235**      **SERIES COLORS**  
**PART B**      **B67V235**      **HARDENER**

## PRODUCT INFORMATION

4.67

### RECOMMENDED SYSTEMS

	Dry Film Thickness / ct.	
	Mils	(Microns)
<b>Steel, immersion or atmospheric service:</b>		
2 cts. Dura-Plate 235	4.0-8.0	(100-200)
<b>Steel, immersion service:</b>		
1 ct. Dura-Plate 235	4.0-8.0	(100-200)
1-2 cts. Dura-Plate UHS	10.0-12.0	(250-300)
<b>Steel, immersion service:</b>		
1 ct. Dura-Plate 235	4.0-8.0	(100-200)
1-2 cts. TarGuard Coal Tar Epoxy	8.0-16.0	(200-400)
<b>Steel, immersion service:</b>		
2 cts. Dura-Plate 235	4.0-8.0	(100-200)
2 cts. SeaGuard Anti-Foulant (refer to respective data pages for coverage)		
<b>Steel, atmospheric service:</b>		
1 ct. Dura-Plate 235	4.0-8.0	(100-200)
1-2 cts. Macropoxy 646	5.0-10.0	(125-250)
<b>Steel, atmospheric service:</b>		
1 ct. Zinc-Clad II Plus	3.0-5.0	(75-125)
1-2 cts. Dura-Plate 235	4.0-8.0	(100-200)
<b>Steel, atmospheric service:</b>		
1 ct. Zinc-Clad IV	3.0-5.0	(75-125)
1-2 cts. Dura-Plate 235	4.0-8.0	(100-200)
<b>Steel, atmospheric service:</b>		
1 ct. Corothane I GalvaPac Zinc Primer	3.0-4.0	(75-100)
1-2 cts. Dura-Plate 235	4.0-8.0	(100-200)
<b>Steel, atmospheric service:</b>		
1 ct. Dura-Plate 235	4.0-8.0	(100-200)
1-2 cts. Acrolon 218 HS	3.0-6.0	(75-150)
or Hi-Solids Polyurethane	3.0-5.0	(75-125)
<b>Concrete/Masonry, immersion service:</b>		
1 ct. Kem Cati-Coat HS Epoxy Filler/Sealer as required to fill voids and provide a continuous substrate	10.0-20.0	(250-500)
2 cts. Dura-Plate 235	4.0-8.0	(100-200)
<b>Galvanized, atmospheric service:</b>		
1 ct. Dura-Plate 235	4.0-8.0	(100-200)

Steel-Seam FT910 - as required for filling pits, and transitioning sharp edges, weld seams, etc...

The systems listed above are representative of the product's use, other systems may be appropriate.

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### SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

**Iron & Steel:**  
Atmospheric: SSPC-SP2 or SSPC-SP12/NACE 5, WJ-4  
Immersion: SSPC-SP10, 2 mil (50 micron) profile or SSPC-SP-12/NACE 5, WJ-2

**Concrete & Masonry:**  
Atmospheric: SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3  
Immersion: SSPC-SP13/NACE 6-4.3.1 or 4.3.2, or ICRI No. 310.2, CSP-1-3

Galvanized, atmospheric: SSPC-SP1

#### Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted C St 2	C St 2	SP 2	-
Pitted & Rusted	D St 2	D St 2	SP 2	-
Rusted	C St 3	C St 3	SP 3	-
Power Tool Cleaning	Pitted & Rusted D St 3	D St 3	SP 3	-

### TINTING

Tint Part A with Maxitones only. Mill White tints at 150%. Ultradeep Base tints at 100%. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

**Note:** Not for immersion service when tinted.

### APPLICATION CONDITIONS

Temperature: 0°F (-18°C) minimum, 120°F (49°C) maximum (air and surface)

At least 5°F (2.8°C) above dew point

Material should be at least 40°F (4.5°C) for optimal performance.

Relative humidity: 85% maximum

Refer to product Application Bulletin for detailed application information.

### ORDERING INFORMATION

Packaging:

**Part A:** 1 gallon (3.78L) and 4 gallons (15.1L) in a 5 gallon (18.9L) container  
**Part B:** 1 quart (0.94L) and 1 gallon (3.78L)  
**Weight:** 11.3 ± 0.2 lb/gal ; 1.35 Kg/L, mixed may vary with color

### SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

### WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



# Protective & Marine Coatings

# DURA-PLATE® 235 MULTI-PURPOSE EPOXY

PART A  
PART B

B67-235  
B67V235

SERIES COLORS  
HARDENER

Revised 12/10

## APPLICATION BULLETIN

4.67

### SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

#### Iron & Steel, Immersion Service:

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2 or SSPC-SP12/NACE 5. For SSPC-SP10/NACE 2, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). For SSPC-SP12/NACE No. 5, all surfaces to be coated shall be cleaned in accordance with WJ-2. Pre-existing profile should be approximately 2 mils (50 microns). Light rust bloom is allowed. Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned.

#### Iron & Steel, Atmospheric Service:

Minimum surface preparation is Hand Tool Clean per SSPC-SP2 or SSPC-SP12/NACE 5. For surfaces prepared by SSPC-SP2, first remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6/NACE 3, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). For surfaces prepared by SSPC-SP12/NACE No. 5, all surfaces shall be cleaned in accordance with WJ-4. Pre-existing profile should be approximately 2 mils (50 microns). Prime any bare steel the same day as it is cleaned.

#### Galvanized Steel

Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1 (recommended solvent is VM&P Naphtha). When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

#### Concrete and Masonry

For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910.

#### Concrete, Immersion Service:

For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2, CSP 1-3.

#### Follow the standard methods listed below when applicable:

ASTM D4258 Standard Practice for Cleaning Concrete.  
ASTM D4259 Standard Practice for Abrading Concrete.  
ASTM D4260 Standard Practice for Etching Concrete.  
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.  
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.  
ICRI No. 310.2 Concrete Surface Preparation.

#### Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	CC Sa 2	CC Sa 2	SP 8	-
Pitted & Rusted	CC Sa 2	CC Sa 2	SP 8	-
Rusted	CC Sa 3	CC Sa 3	SP 6	-
Power Tool Cleaning	D Sa 3	D Sa 3	SP 3	-
Pitted & Rusted	D Sa 3	D Sa 3	SP 3	-

### APPLICATION CONDITIONS

Temperature: 0°F (-18°C) minimum, 120°F (49°C) maximum (air and surface)  
At least 5°F (2.8°C) above dew point

Material should be at least 40°F (4.5°C) for optimal performance.

Relative humidity: 85% maximum

### APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up .....Reducer R7K104

#### Airless Spray

Unit.....30:1 Pump  
Pressure.....2400 - 2800 psi  
Hose.....1/4" - 3/8" ID  
Tip......015" - .019"  
Filter.....60 mesh  
Reduction.....As needed, up to 10% by volume

#### Conventional Spray

Gun .....DeVilbiss MBC-510  
Fluid Tip .....E  
Air Nozzle.....704  
Atomization Pressure.....60-65 psi  
Fluid Pressure.....5-15 psi  
Reduction.....As needed, up to 10% by volume

#### Brush

Brush.....Natural Bristle  
Reduction.....Not recommended

#### Roller

Cover .....3/8" woven with solvent resistant core  
Reduction.....Not recommended

If specific application equipment is not listed above, equivalent equipment may be substituted.



# Protective & Marine Coatings

# DURA-PLATE® 235 MULTI-PURPOSE EPOXY

PART A  
PART B

B67-235  
B67V235

SERIES COLORS  
HARDENER

## APPLICATION BULLETIN

4.67

### APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly using low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine 4 parts by volume of Part A with 1 part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated prior to application. Re-stir before using.

If reducer solvent is used, add only after both components have been thoroughly mixed, after sweat-in.

Apply paint at the recommended film thickness and spreading rate as indicated below:

#### Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	6.0 (150)	12.0 (300)
Dry mils (microns)	4.0* (100)	8.0* (200)
~Coverage sq ft/gal (m <sup>2</sup> /L)	136 (3.3)	272 (6.6)
Theoretical coverage sq ft/gal (m <sup>2</sup> /L) @ 1 mil / 25 microns dft	1088 (26.6)	

\*See Performance Tips section

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

#### Drying Schedule @ 6.0 mils wet (150 microns):

	@ 0°F/-18°C	@ 40°F/4.5°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
To touch:	18 hours	3.5 hours	2 hours	20 minutes
To handle:	36 hours	12 hours	3.5 hours	40 minutes
To recoat:				
minimum:	36 hours	12 hours	3.5 hours	40 minutes
maximum:	6 months	6 months	6 months	6 months
Cure to service:	30 days	14 days	7 days	3 days

If maximum recoat time is exceeded, abrade surface before recoating.  
Drying time is temperature, humidity, and film thickness dependent.

Pot Life:	16 hours	8 hours	4 hours	1 hour
Sweat-in-time:	1 hour	30 minutes	15 minutes	5 minutes

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

### CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Reducer R7K104. Clean tools immediately after use with Reducer R7K104. Follow manufacturer's safety recommendations when using any solvent.

### DISCLAIMER

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### PERFORMANCE TIPS

Stripe coat crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Insufficient ventilation, incomplete mixing, miscatalyzation, and external heaters may cause premature yellowing.

Excessive film build, poor ventilation, and cool temperatures may cause solvent entrapment and premature coating failure.

**For Immersion Service:** (if required) Holiday test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete.

Do not mix previously catalyzed material with new.

Do not apply the material beyond recommended pot life.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Reducer R7K104.

Not recommended for immersion service when tinted.

When coating over aluminum and galvanizing, recommended dft is 2-4 mils (50-100 microns).

Refer to Product Information sheet for additional performance characteristics and properties.

### SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

### WARRANTY

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# Protective & Marine Coatings

# SHERTHANE® 2K URETHANE

PART A  
PART B

B65-150 SERIES  
B65V150

GLOSS  
HARDENER

Revised 11/10

## PRODUCT INFORMATION

5.24

### PRODUCT DESCRIPTION

SHERTHANE 2K URETHANE is a 2-component, low VOC, aliphatic acrylic modified polyurethane designed for use in industrial environments.

- A chemical and abrasion resistant urethane enamel.
- A heavy duty maintenance coating for use in "high visibility areas."
- Outstanding weatherability, abrasion resistance, and flexibility
- Outstanding application procedures

### PRODUCT CHARACTERISTICS

<b>Finish:</b>	Gloss
<b>Color:</b>	Wide range of colors available
<b>Volume Solids:</b>	64% ± 2% mixed, may vary by color
<b>Weight Solids:</b>	77% ± 2%, mixed, may vary by color
<b>VOC (EPA method #24):</b>	
Unreduced:	<340 g/L; 2.8 lb/gal
Reduced 5%:	<340 g/L; 2.8 lb/gal May vary by color
<b>Mix Ratio:</b>	4:1 by volume

### Recommended Spreading Rate per coat:

	Minimum	Maximum
<b>Wet mils (microns)</b>	3.0 (75)	6.0 (150)
<b>Dry mils (microns)</b>	2.0 (50)	4.0 (100)
<b>~Coverage sq ft/gal (m<sup>2</sup>/L)</b>	256 (6.3)	512 (12.5)
<b>Theoretical coverage sq ft/gal (m<sup>2</sup>/L) @ 1 mil / 25 microns dft</b>	1024 (25.0)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

### Drying Schedule @ 4.0 mils wet (100 microns):

	@ 40°F/4.5°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
<b>To touch:</b>	5 hours	1 hour	30 minutes
<b>To handle:</b>	16 hours	4 hours	2 hours
<b>To recoat:</b>			
<b>minimum:</b>	16 hours	4 hours	2 hours
<b>maximum:</b>	3 months	3 months	3 months
<b>To cure:</b>	14 days	7 days	7 days
<b>Pot Life:</b>	12 hours	6 hours	2 hours
<b>Sweat-in-Time:</b>	None required		

If maximum recoat time is exceeded, abrade surface before recoating.  
Drying time is temperature, humidity, and film thickness dependent.

<b>Shelf Life:</b>	Part A - 36 months, unopened Part B - 12 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C).
<b>Flash Point:</b>	95°F (35°C), mixed (Seta Flash)
<b>Reducer/Clean Up:</b>	Xylene, R2K4

### RECOMMENDED USES

Use over prepared substrates in industrial environments, such as:

- Offshore platforms
- Rolling stock
- Paper mills
- Clean rooms
- Conveyors
- Refineries
- Exterior surfaces of steel tanks
- Structural steel
- Chemical processing equipment
- Exterior metal siding and trim
- Oil field machinery
- Handrails
- Suitable for use in USDA inspected facilities.

### PERFORMANCE CHARACTERISTICS

**Substrate\*:** Steel

**Surface Preparation\*:** SSPC-SP6/NACE 2

**System Tested\*:**

- 1 ct. Recoatable Epoxy Primer @ 4.0 mils (100 microns) dft
  - 1 ct. SherThane 2K Urethane @ 3.0 mils (75 microns) dft
- \*unless otherwise noted below

Test Name	Test Method	Results
<b>Abrasion Resistance</b>	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	108 mg loss
<b>Accelerated Weathering - QUV</b>	ASTM D4587, QUV-A, 3000 hours	Passes, >70% Gloss retention
<b>Adhesion</b>	ASTM D4541 - Patti	2364 psi
<b>Corrosion Weathering</b>	ASTM D5894, 45 cycles, 15,120 hours	Rating 10 per ASTM D714 for blistering; Rating 9 per ASTM D610 for rusting
<b>Dry Heat Resistance</b>	ASTM D2485	200°F (93°C)
<b>Exterior Durability</b>	1 year at 45° South	Excellent
<b>Flexibility</b>	ASTM D522, 180° bend, 1/4" mandrel	Passes
<b>Moisture Condensation Resistance</b>	ASTM D4585, 100°F (38°C), 2000 hours	No blisters, rust, delamination, or rust creepage at scribe
<b>Pencil Hardness</b>	ASTM D3363	B
<b>Salt Fog Resistance</b>	ASTM B117, 2000 hours	Rating 8 per ASTM D714 for blistering; Rating 10 per ASTM D610 for rusting
<b>Thermocycling</b>	15 cycles (1 cycle = 4 hours fresh water immersion, 16 hours freezing, and 4 hours @ 120°F / 49°C)	Excellent, 100% adhesion, no film failure

Meets the requirements of SSPC Paint No. 36, Levels 2 & 3.



# Protective & Marine Coatings

# SHERTHANE® 2K URETHANE

PART A  
PART B

B65-150 SERIES  
B65V150

GLOSS  
HARDENER

## PRODUCT INFORMATION

5.24

### RECOMMENDED SYSTEMS

	Dry Film Thickness / ct.	
	Mils	(Microns)
<b>Steel, universal primer:</b>		
1 ct. Kern Bond HS Primer	2.0-5.0	(50-125)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)
<b>Steel, epoxy primer:</b>		
1 ct. Recoatable Epoxy Primer	4.0-6.0	(100-150)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)
<b>Steel, epoxy mastic primer:</b>		
1 ct. Epoxy Mastic Aluminum II	6.0-8.0	(150-200)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)
<b>Steel, inorganic zinc-rich primer:</b>		
1 ct. Zinc-Clad II Plus	3.0-5.0	(75-125)
1 ct. Recoatable Epoxy Primer	4.0-6.0	(100-150)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)
<b>Galvanized Metal:</b>		
1 ct. Tile-Clad High Solids	2.5-4.0	(63-100)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)
<b>Aluminum:</b>		
1 ct. DTM Wash Primer	0.7-1.3	(18-32)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)
<b>Concrete:</b>		
1 ct. Heavy Duty Block Filler	10.0-18.0	(250-450)
1-2 cts. SherThane 2K Urethane	2.0-4.0	(50-100)

To enhance SherThane 2K Urethane product performance and extend long term weathering characteristics, apply 1 coat of Diamond-Clad Clear Coat Urethane @ 1.0-2.0 mils (25-50 microns) dft.

The systems listed above are representative of the product's use, other systems may be appropriate.

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### SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

- Minimum recommended surface preparation:
- \* Iron & Steel: SSPC-SP6/NACE 3, 2 mil (50 micron) profile
  - \* Aluminum: SSPC-SP1
  - \* Galvanizing: SSPC-SP1
  - \* Concrete & Masonry: SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3
- \* Primer required

#### Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	C St 2	C St 2	SP 2	-
Pitted & Rusty	D St 2	D St 2	SP 3	-
Rusty	C St 3	C St 3	SP 3	-
Power Tool Cleaning	D St 3	D St 3	SP 3	-
Pitted & Rusty	D St 3	D St 3	SP 3	-

### TINTING

Tint with Maxitoner colorants only into Part A at 100% tint strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

### APPLICATION CONDITIONS

Temperature:	40°F (4.5°C) minimum, 120°F (49°C) maximum (air, surface, and material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

Refer to product Application Bulletin for detailed application information.

### ORDERING INFORMATION

Packaging:	
Part A:	1 gallon (3.78L) and 4 gallon (15.1L) kits
Part B:	1 quart (0.94L) and 1 gallon (3.78L)
Weight:	11.55 ± 0.2 lb/gal ; 1.38 Kg/L mixed, may vary with color

### SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

### WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



# Protective & Marine Coatings

# SHERTHANE® 2K URETHANE

PART A  
PART B

B65-150 SERIES  
B65V150

GLOSS  
HARDENER

Revised 11/10

## APPLICATION BULLETIN

5.24

### SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

#### Iron & Steel

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3. For better performance, use Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

#### Aluminum

Remove all oil, grease, dirt, oxide and other foreign material by Solvent Cleaning per SSPC-SP1. Primer required

#### Galvanized Steel

Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1. When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned. Primer required.

#### Concrete and Masonry

For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910. Primer required.

#### Follow the standard methods listed below when applicable:

ASTM D4258 Standard Practice for Cleaning Concrete.  
ASTM D4259 Standard Practice for Abrading Concrete.  
ASTM D4260 Standard Practice for Etching Concrete.  
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.  
SSPC-SP 13/Nace 6 Surface Preparation of Concrete.  
ICRI No. 310.2 Concrete Surface Preparation.

Surface Preparation Standards				
Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal	Sa 3	Sa 3	SP 5	1
Near White Metal	Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	St 2	C St 2	SP 2	-
Pitted & Rusted	St 2	D St 2	SP 2	-
Rusted	St 3	C St 3	SP 3	-
Power Tool Cleaning	Pitted & Rusted D St 3	D St 3	SP 3	-

### APPLICATION CONDITIONS

Temperature: 40°F (4.5°C) minimum, 120°F (49°C) maximum (air, surface, and material)  
At least 5°F (2.8°C) above dew point

Relative humidity: 85% maximum

### APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up: Xylene, R2K4

#### Airless Spray

Pressure.....2400 psi  
Hose.....3/8" ID  
Tip .....015" - .017"  
Filter .....80 mesh  
Reduction.....As needed up to 5% by volume

#### Conventional Spray

Gun .....Binks 95  
Fluid Nozzle .....63 B  
Atomization Pressure.....50 - 70 psi  
Fluid Pressure.....20 - 25 psi  
Reduction.....As needed up to 5% by volume

#### Brush

Brush.....Natural Bristle  
Reduction.....As needed up to 10% by volume

#### Roller

Cover .....3/8" woven with solvent resistant core  
Reduction.....As needed up to 10% by volume

If specific application equipment is not listed above, equivalent equipment may be substituted.



# Protective & Marine Coatings

# SHERTHANE® 2K URETHANE

PART A  
PART B

B65-150 SERIES  
B65V150

GLOSS  
HARDENER

## APPLICATION BULLETIN

5.24

### APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly with low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine 4 parts by volume of Part A with 1 part by volume of Part B. Thoroughly agitate the mixture with power agitation for 5 minutes.

If reducer solvent is used, add only after both components have been thoroughly mixed.

Apply paint at the recommended film thickness and spreading rate as indicated below:

#### Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	3.0 (75)	6.0 (150)
Dry mils (microns)	2.0 (50)	4.0 (100)
~Coverage sq ft/gal (m <sup>2</sup> /L)	256 (6.3)	512 (12.5)
Theoretical coverage sq ft/gal (m <sup>2</sup> /L) @ 1 mil / 25 microns dft	1024 (25.0)	

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

#### Drying Schedule @ 4.0 mils wet (100 microns):

	@ 40°F/4.5°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
To touch:	5 hours	1 hour	30 minutes
To handle:	16 hours	4 hours	2 hours
To recoat:			
minimum:	16 hours	4 hours	2 hours
maximum:	3 months	3 months	3 months
To cure:	14 days	7 days	7 days
Pot Life:	12 hours	6 hours	2 hours
Sweat-in-Time:	None required		

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

### CLEAN UP INSTRUCTIONS

Clean spills and splatters immediately with Xylene, R2K4. Clean tools immediately after use with Xylene, R2K4. Follow manufacturer's safety recommendations when using any solvent.

### DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

### PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not mix previously catalyzed material with new.

Do not apply the material beyond recommended pot life.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Xylene, R2K4.

Mixed coating is sensitive to water. Use water traps in all air lines. Moisture contact can reduce pot life and affect gloss and color.

Refer to Product Information sheet for additional performance characteristics and properties.


### SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

### WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

	Specification No	03 - 102
	Item No	
Painting and Coatings Specification	Engineering Spec	03 - 102
	Issue Date	15-Feb-12

### Coating Specification for Structural Steel and Piping - Below Grade

All below grade structural steel, headers, mainline valves, weld fittings, and hot bends which are not furnished coated shall be blasted, brush coated or spray coated using coal tar epoxy or liquid epoxy system.

#### A. Coal Tar System

1. **Acceptable Material:**  
Carboline Carbomastic 14 two part high build epoxy coal tar or equal.
2. **Surface Preparation:**  
SSPC-SP6 commercial blast to provide 1.0 to 2.0 mil anchor profile.
3. **Prime Coat:**  
None
4. **Intermediate Coat:**  
One coat Carbomastic 14 high build epoxy coal tar applied to a dry film thickness of 10 to 12 mils.
5. **Finish Coat:**  
One coat Carbomastic 14 high build epoxy coal tar applied to a dry film thickness of 10 to 12 mils. Total dry film thickness shall not be less than 20 mils after application of both coats.
6. **Application:**  
Shall be done in accordance with manufacturer's standard application instructions.

#### B. Liquid Epoxy System

1. **Acceptable Material:**  
Denso Protal 7200 two-part liquid epoxy for warm weather applications  
Denso Protal 7125 two-part liquid epoxy for cold weather applications
2. **Application specifications per manufacturer's recommendations.**

# PRODUCT DATA SHEET

## PROTAL 7200

### Fast Cure, High Build Pipeline Coating

#### Description

Protal 7200 is a VOC free, 100% solids, 2 part epoxy coating specially formulated to compliment FBE coated pipe. It is a high build liquid coating that is brush or spray applied (referred to as Protal 7250 in Canada) in one coat in the field or shop. It cures very fast to allow quick handling and backfill times.

#### Uses

On-site protection of girth welds, tie-ins, welds for boring applications, repairs to FBE, push-rack applications, station piping, fittings and fabrication. Also used for main line pipe coating, sacrificial coating for directional drill and road bore pipe, and rehabilitation of existing pipelines.

#### Features

- Fast touch dry and set times
- High temperature resistance (up to 185°F)
- High build (up to 50 mils in one coat)
- Excellent adhesion (compliments FBE coated pipe)
- High abrasion resistance for drilling applications
- Safe and environmentally friendly
- Does not shield cathodic protection
- Can be applied with brush, roller or spray
- Available in a variety of packaging options

#### Application

**Brush:** Prepare surfaces by grit blasting to a clean near white finish, SSC-SP 10/NACE No. 2. Appropriate angular grit shall be used to achieve a 2.5 to 5 mil anchor profile. Initially stir the base and hardener. Add the hardener to base and mix at a slow speed until a constant color is achieved making sure all sides of container are scraped. Apply mixed material onto surface and brush, trowel or roll to required mil thickness. A wet film thickness gauge shall be used to measure mil thickness. If surface temperature falls below 50°F (10°C), surface should be preheated to achieve faster cure. Preheat may be achieved with a propane torch or induction coil. Resin and hardener component shall be kept warm, at a minimum of 60°F (15°C), to mix easily.

**Spray:** Prepare surfaces by grit blasting to a clean near white finish, SSC-SP 10/ NACE No. 2. The equipment should be a plural component airless spray unit with a proportioning pump capable of a volume mixing ratio of 3:1. Standard ancillary equipment should include minimum 10 gallon hoppers, 2 ea. static mixers, 25 ft. max x 1/4" whip hose, and mastic gun with a 19 to 27 thou tip. (Applicator should consult with Denso regarding recommended equipment). Part A should be heated to 140°F -150°F and Part B heated to 100°F -110°F. Hose bundle shall be set at 140°F -150°F. A wet on wet spray technique should be used to achieve a minimum thickness of 20 mils. The coating thickness should be measured using a wet film thickness gauge.

For complete application instructions please refer to Protal 7200 application specifications.



# Protal 7200

## TECHNICAL DATA

PROPERTIES	VALUE
<b>Solids Content</b>	100%
<b>Base Component - (Unmixed) @ 77°F (25°C)</b>	
Specific Gravity	1.63
Viscosity	255,000 cps
Color	White
<b>Hardener - (Unmixed) @ 77°F (25°C)</b>	
Specific Gravity	1.05
Viscosity	5,500 cps
Color	Dark Green
<b>Mixed Material - (Mixed) @ 77°F (25°C)</b>	
Specific Gravity	1.63
Viscosity	170,000 cps
Color	Green
<b>Mixing Ratio (A/B) by Volume</b>	3 Parts Base: 1 Part Hardener
<b>Cure Times</b>	
Pot Life @ 77°F (25°C)	14 - 17 Minutes
Pot Life @ 97°F (36°C)	7 - 8 Minutes
Handling Time @ 77°F (25°C)	2.5 - 3 Hours
Handling Time @ 117°F (47°C)	1 Hour
Handling Time @ 157°F (69°C)	20 Minutes
<b>Recoat Window</b>	
@ 57°F (14°C)	5 Hours
@ 77°F (25°C)	2 Hours
@ 97°F (36°C)	1 Hour
<b>Theoretical Coverage</b>	14 ft <sup>2</sup> /30 mils/liter
<b>Thickness - Weld Joints / FBE Repairs</b>	
Minimum/Maximum	20/60 mils
Recommended	25 - 30 mils
<b>Thickness - Bore Pipe</b>	
Minimum/Maximum	35/60 mils
Recommended	45 - 55 mils
<b>Holiday Detection - based on min. mil. thickness specified</b>	125 volts/mil
<b>Cathodic Disbondment Test (ASTM G95)</b>	
28 Days @ 77°F (25°C)	3 mm
28 Days @ 150°F (65°C)	4 mm
28 Days @ 175°F (80°C)	7 mm
<b>Hardness (ASTM D-2240-02)</b>	Shore D 85 +/-2
<b>Impact Resistance (ASTM G14-88)</b>	60.89 in-lbs.
<b>Adhesion to Steel/FBE (ASTM D-4541-02)</b>	3,200 psi
<b>Application and Service Temperature</b>	-30°F to 185°F (-34°C to 85°C)

Note: If temperature falls below 50°F (10°C), surface must be preheated.

**STORAGE:** Minimum 24 months when stored in original containers @ 40°F (4°C) to 105°F (41°C). On job site where temperatures are below 50°F (10°C) product should be kept warm to mix properly (65°F to 85°F optimal).

**CLEANING:** Clean equipment with MEK or equivalent solvent cleaner.

**HEALTH AND SAFETY:** Wear protective clothing and ensure adequate ventilation. Avoid contact with skin and eyes. See material safety data sheet for further information.

**PACKAGING:** 1, 1.5, 1.75 and 2 liter kits and 75 liter & 800 liter kits standard. Dual cartridge repair tubes (400 ml & 50 ml) and dispensing guns available for small repair areas.

The information given on this sheet is intended as a general guide only and should not be used for specification purposes. We believe the information to be accurate and reliable but do not guarantee it. We assume no responsibility for the use of this information. Users must, by their own tests, determine the suitability of the products and information supplied by us for their own particular purposes. No patent liability can be assumed.



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# PRODUCT DATA SHEET

## PROTAL 7125

### Fast Cure, Low Temperature Pipeline Coating

#### Description

Protal 7125 is specifically formulated to be applied to colder substrates at colder ambient temperatures. It is a high build liquid coating that is hand applied in one coat to many areas of in-service pipelines or during pipeline construction in the field. It cures fast to allow quick handling and backfilling, even down to -4°F (-20°C). Protal 7125 is intended for use where a quick cure is required at lower substrate and/or ambient conditions such as during winter applications or on colder operating temperature pipelines.

#### Uses

Used as a rehabilitation coating for existing low temperature in-service operating pipelines, station piping, girth welds, tie-ins, push rack (laybarge applications), repairs to FBE, fittings and fabrication. It may also be used for new construction where colder temperatures exist and preheating or post heating is not practical or feasible.

#### Features

- Cold temperature application down to -4°F (-20°C)
- Will not freeze
- Fast cure, fast initial set
- Will cure when submersed in water
- High build (in one coat)
- Excellent adhesion (compliments FBE coated pipe)
- Does not shield cathodic protection
- Repair cartridges available

#### Application

Prepare surfaces by grit blasting to a clean near white finish, SSC-SP 10/ NACE No. 2. Appropriate angular grit shall be used to achieve a 2.5 to 5 mil anchor profile. (Repair areas shall be roughened using Carborundum cloth or 80 grit sandpaper and wiped clean with an isopropyl alcohol soaked cloth prior to patching.) Add Part B (hardener) to Part A (base) and mix with a stir stick or power mixer, (at a slow speed so as not to introduce air into the product), until a consistent light gray color is achieved without streaks present. During the mixing process, the inside surface of the container should be scraped to obtain a complete mixture. Pour mixed material onto surface and brush, trowel or roll to required thickness. A wet film thickness gauge shall be used to measure mil thickness (min. 20 mils). Backfilling times are dependent on temperature and will be extended at cooler temperatures. Note: Denso recommends surface temperature during application shall not exceed 68°F (20°C) for optimum performance characteristics.

For complete application instructions, refer to "Protal 7125 Hand Application Specifications".



# Protal 7125

## TECHNICAL DATA

PROPERTIES	VALUE
<b>Percent Reactive</b>	100%
<b>Base Component - (Unmixed) @ 77°F (25°C)</b>	
Specific Gravity	1.54
Viscosity	Thixotropic Liquid
Color	White
<b>Hardener - (Unmixed) @ 77°F (25°C)</b>	
Specific Gravity	1.48
Viscosity	Soft Paste
Color	Black
<b>Mixed Material - (Mixed) @ 77°F (25°C)</b>	
Specific Gravity	1.53
Viscosity	Thixotropic Liquid
Color	Light Gray
<b>Mixing Ratio (A/B) by Volume</b>	10 parts base:1 part hardener
<b>Gel Time/Pot Life — 1.5 liter kit</b>	
Material @ 68°F (20°C)	10 Minutes
Material @ 50°F (10°C)	18 Minutes
Material @ 32°F (0°C)	30 Minutes
Material @ 14°F (-10°C)	45 Minutes
<b>Back Fill Times — Material @ 50°F (10°C)</b>	
Ambient & Substrate Temp. @ 68°F (20°C)	20 - 30 Minutes
Ambient & Substrate Temp. @ 50°F (10°C)	45 - 60 Minutes
Ambient & Substrate Temp. @ 32°F (0°C)	2 Hours
Ambient & Substrate Temp. @ 14°F (-10°C)	3 - 4 Hours
<b>Theoretical Coverage</b>	14 ft <sup>2</sup> (1.3 m <sup>2</sup> )/liter at 25-30 mils DFT
<b>Actual Coverage</b>	10 ft <sup>2</sup> (1.0 m <sup>2</sup> )/liter at 25-30 mils DFT
<b>Thickness</b>	
Minimum/Maximum	20/50 mils
Recommended	25 - 30 mils
<b>Holiday Detection</b>	125 volts / mil
<b>Cathodic Disbondment 28 Days @ 68°F (20°C)</b>	7.1 mm
<b>Adhesion to Steel</b>	2400 psi
<b>Hardness (ASTM 2240)</b>	Shore D 85 min.
<b>Gouge Resistance</b>	3 Passes = 0 Fail @ 50 kg
<b>Application Temperature (surface)</b>	-4°F to 68°F (-20°C to 20°C)
<b>Service Temperature</b>	-40°F to 150°F (-40°C to 65°C)

**STORAGE:** 12 months when stored in original containers between 40°F and 80°F (4°C and 27°C). Product will not freeze.

**CLEANING:** Clean equipment with MEK or equivalent solvent cleaner.

**HEALTH AND SAFETY:** Spray or brush under well ventilated conditions. Wear suitable protective clothing and glasses. See material safety data sheet.

**PACKAGING:** 0.8 liter kits, 1.5 liter kits and 825 ml repair cartridges.

Dispensing guns and static mixing tips for repair cartridges sold separately.



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# DuPont Technical Information Sheet

**Product Number:** 7-1631S  
**Description:** Red E-Z Patch Stick

## Introduction:

Polyamide based thermoplastic repair material Nap-Gard® 7-1631S "E-Z" stick is used quickly to repair small holidays of the Nap-Gard® fusion bonded epoxy coatings. This polymeric material is provided in "Stick" form and is hot melted onto the area needing repair.

- Easy to Use
- Speeds Production Time
- Facilitates Quick Repair at the Ditch
- Maximum operating temperature 65°C/149°F

## APPLICATION GUIDELINES

1. Prior to repairs, the area surrounding the defect shall be abraded utilizing 80 grit carborundum cloth and/or a coarse file if the removal of small silver is necessary. All loose particles must be removed by proper methods.
2. The surface shall be heated with a small torch until the stick melts when touched to the surface. Avoid charring the surface. The stick shall then be rubbed over the heated surface, building up a smooth puddle of patching compound over the abraded area while heat from the torch continues to be applied. 15 mils minimum thickness is recommended.

## APPLICATION GUIDELINES



## WARNING!

Never drip the "E-Z Stick" like a candle. This will result in weakened adhesion.

Performance depends on film thickness. Consult Nap-Gard® specialist for specific recommendations.

\*Transportation: The material is stable during transportation for duration of up to 45 days at temperatures below 35°C (95°F). If it exceeds the recommended time or temperature during transportation or storage, the product should be re-certified.

Revised 12/9/2010

## DuPont Industrial Coating Solutions customer service:

In the U.S., call 1-800-247-3886 or e-mail [info.powder@usa.dupont.com](mailto:info.powder@usa.dupont.com)  
In Canada, call 1-888-447-2598 or e-mail [powder.info@dupont.com](mailto:powder.info@dupont.com)

[www.powder.dupont.com](http://www.powder.dupont.com)

**WARRANTY POLICY:** Seller certifies that all coatings delivered to Customer in unopened factory filled containers meet all pertinent quality standards presented in its current published literature. Since matters of surface preparation, application procedures, curing procedures and other local factors that affect coating performance are beyond Seller's control, Seller assumes no liability for coating failure other than to supply replacement material for a coating material proven to be defective. Customer will determine suitability of this product for its use and thereby assume all risks and liabilities in connection therewith. Seller will not be liable for any injuries, damages or other losses derived, directly or indirectly, from or as a consequence of Customer's use of the product. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, RELATING TO ITS PRODUCTS AND THEIR APPLICATION, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES.

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# DuPont Technical Information Sheet

**Product Number:** 7-1677S  
**Description:** Green E-Z Patch Stick

## Introduction:

Polyamide based thermoplastic repair material Nap-Gard® 7-1677S "E-Z" stick is used quickly to repair small holidays of the Nap-Gard® fusion bonded epoxy coatings. This polymeric material is provided in "Stick" form and is hot melted onto the area needing repair.

- Easy to Use
- Speeds Production Time
- Facilitates Quick Repair at the Ditch
- Maximum operating temperature 65°C/149°F

## APPLICATION GUIDELINES

1. Prior to repairs, the area surrounding the defect shall be abraded utilizing 80 grit carborundum cloth and/or a coarse file if the removal of small silver is necessary. All loose particles must be removed by proper methods.
2. The surface shall be heated with a small torch until the stick melts when touched to the surface. Avoid charring the surface. The stick shall then be rubbed over the heated surface, building up a smooth puddle of patching compound over the abraded area while heat from the torch continues to be applied. 15 mils minimum thickness is recommended.

## APPLICATION GUIDELINES



## WARNING!

Never drip the "E-Z Stick" like a candle. This will result in weakened adhesion. Performance depends on film thickness. Consult Nap-Gard® specialist for specific recommendations.

\*Transportation: The material is stable during transportation for duration of up to 45 days at temperatures below 35°C (95°F). If it exceeds the recommended time or temperature during transportation or storage, the product should be re-certified.

Revised 12/9/2010

## DuPont Industrial CoatingSolutions customer service:

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Industrial CoatingSolutions



## K-60

### Corrosion protective heat-shrinkable sleeve

For more than 35 years, Canusa-CPS has been a leading developer and manufacturer of specialty pipeline coatings for the sealing and corrosion protection of pipeline joints and other substrates. Canusa-CPS high performance products are manufactured to the highest quality standards and are available in a number of configurations to accommodate many specific project applications.

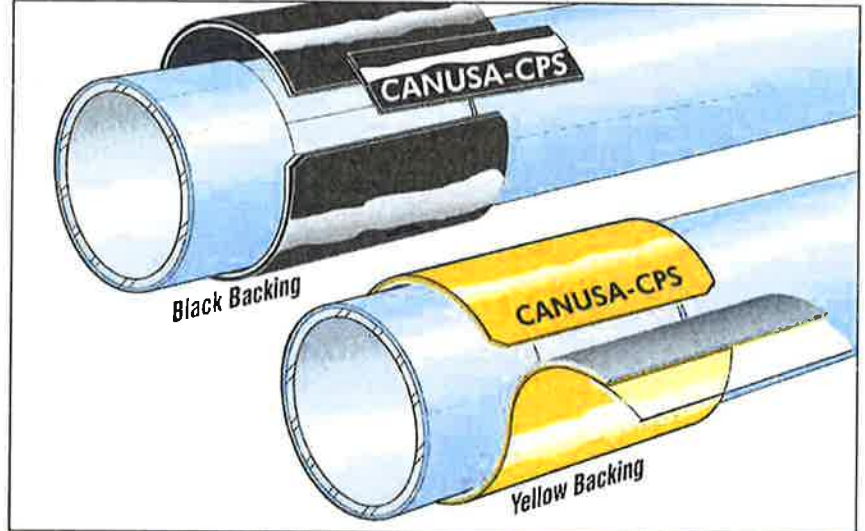
#### Product Description

The Canusa K-60 wraparound sleeve is designed for corrosion protection of buried and exposed steel pipelines operating up to 60°C (140°F). K-60 consists of a crosslinked polyolefin backing, coated with a technologically advanced corrosion protective adhesive, which effectively bonds to steel substrates and common pipeline coatings including polyethylene and fusion bonded epoxy.

#### Features & Benefits

##### Rapid & Reliable Installation

K-60 has a patented one-piece Wrapid Sleeve™ construction that incorporates a pre-attached closure strip as part of the sleeve. Because the closure has been factory applied, quick and reliable field installation is easy to accomplish. For added flexibility, CanusaWrap™ two-piece cut sleeves or bulk rolls are also available. K-60 is supplied with a yellow polyethylene backing for buried pipelines or a black backing with added UV resistance for above ground pipelines.



#### Long-Term Corrosion Protection

K-60 provides excellent resistance to cathodic disbondment resulting in effective long term corrosion protection. Once installed, K-60 provides the structural integrity of a seamless tube, and provides the substrate with durable protection against abrasion and chemical attack.

#### Saves Time & Money

K-60 can be supplied with a pre-attached closure or in bulk roll / cut sheet format with a separate closure. This versatility provides contractors choice and convenience depending on the type of project. For large projects, the unique construction of a pre-attached closure allows for quicker installation time versus handling, positioning and installing separate closures. For smaller projects or where multiple pipeline diameters are present, the convenience of bulk rolls or pre-cut sleeves with separate closures provides for maximum flexibility and minimizes inventory costs.

#### Applications

-  2LPE Pipeline Coatings
-  Fusion Bonded Epoxy
-  Pre-Insulated Pipes

#### Configurations

-  Wrapid Sleeve™
-  CanusaWrap™
-  2-Layer
-  Standard Shrink





#### Pipe Sizes

-  55 - 610 (2" - 24")

#### Temperature Range

-  Up to 60°C (140°F)

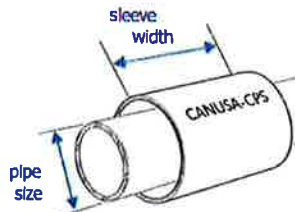
## Product Selection Guide

Sleeve Operating Characteristics	 <b>Pipeline Operating Temperature</b>	Celsius	Fahrenheit	 <b>Mastic Adhesive K-60</b>	
		110°	230°		
		90°	194°		
		70°	158°		
		50°	122°		
		30°	86°		
	Minimum Installation Temperature		°C (°F)	65 (149)	
	Maximum Pipeline Operating Temperature		°C (°F)	60 (140)	
	Resistance to Circumferential Forces			good	
	Resistance to Soil Stress			good	
	Resistance to Axial Pipe Movement			good	
	Main Line Coating Compatibility			PE, PP, FBE, PU, Coal tar, Bitumen,	

## Typical Product Properties

Category	Property	Test Standard	Unit	Value
Adhesive	Softening Point	ASTM E28	°C (°F)	87 (189)
	Lap Shear	ASTM D1002	N/cm <sup>2</sup> (psi)	35 (51)
Backing	Specific Gravity	ASTM D792		.93
	Tensile Strength	ASTM D638	MPa (psi)	20 (2900)
	Elongation	ASTM D638	%	600
	Hardness	ASTM D2240	Shore D	46
	Abrasion Resistance	ASTM D1044	mg	45
	Volume Resistivity	ASTM D257	ohm-cm	10 <sup>17</sup>
	Dielectric Voltage Brkwn.	ASTM D149	kV/mm	20
Sleeve	Impact	ASTM G14	J	10
	Indentation	ASTM G17	Holiday Test	pass @ 10 kv
	Peel Adhesion	ASTM D1000	N/cm (pli)	88 (50)
	Cathodic Disbondment	ASTM G8	mm rad	8
	Water Absorption	ASTM D570	%	0.05
	Low Temp. Flexibility	ASTM D2671C	°C (°F)	-20 (-4)

## How To Order<sup>1</sup>:

Dimensions & Ordering Info	<b>K-60 230-450 YE</b>		<b>Standard Ordering Options</b>		
			T Thickness	L Thickness	
			T	L	
	Colour ▶		YE-Yellow, BK - Black		
	Sleeve Width ▶		300mm, 450mm, 600mm, 900mm (12", 18", 24", 36")		
	Pipe Size ▶		55 - 610mm (2" - 24")		
	Adhesive (min. thickness as supplied) ▶		1.25 mm (50 mils)	1.7 mm (65 mils)	
	Backing (min. thickness as supplied) ▶		0.6 mm (25 mils)	0.9 mm (36 mils)	
Product Name ▶		<b>K-60</b>		<b>Min. Sleeve Width =</b> Bare Steel Dimension + 50 mm (2") min. on each side of the pipe joint.	

The above represent standard Wrapid Sleeve™ ordering options. Consult your Canusa representative for any unique project requirements.

<sup>1</sup> For CanusaWrap™ bulk rolls, consult you Canusa representative. K-60 requires CLW closures.



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Canusa warrants that the product conforms to its chemical and physical description and is appropriate for the use stated on the installation guide when used in compliance with Canusa's written instructions. Since many installation factors are beyond our control, the user shall determine the suitability of the products for the intended use and assume all risks and liabilities in connection therewith. Canusa's liability is stated in the standard terms and conditions of sale. Canusa makes no other warranty either expressed or implied. All information contained in this installation guide is to be used as a guide and is subject to change without notice. This installation guide supersedes all previous installation guides on this product. E&OE



### Product Description

Powercrete J is the ultimate girth weld coating for FBE and CTE coated pipe. It is a 100% solids, high-build, liquid epoxy and can be used as mainline coating, for repairs & rehabilitation of pipelines operating at maximum temperatures up to 60°C (140°F) and other metal structures. This 2-component, solvent-free epoxy can easily achieve a dry film thickness of up to 20 mils in a single pass.

### Product Applications

- Pipe Bends, Fittings, Valves & Odd Shapes
- Mainline Coating as well Pipeline Repair & Rehabilitation
- Girth Welds / Field Joints
- Directional Drilling
- Water Pipe OD
- Jetty piles, off-shore & marine structures
- Any bare steel structure in need of protection

### Product Features & Benefits

- 100% Solids Epoxy; No V.O.C.s and no isocyanates
  - Safe to use
- Bisphenol A Chemistry
  - Suitable for pipeline operating temperatures to 60°C (140°F)
- Excellent Mechanical Properties
  - Can be used in directional drill and thrust bore applications
- Exceeds AWWA C-210 requirements
- High Build in a Single Application
  - Cost saving formulation can build 20 mils in one pass
- Same Formula can be Hand or Spray Applied
  - Flexibility in difficult to coat field conditions
- Excellent Wetting Properties to Bare Steel
  - Exceptional adhesion, cathodic disbondment and soil stress resistance on bare steel

### Product Properties

Property	Condition	Test Method	Typical Value	
			US Imperial	Metric
Specific Gravity	(Mixed)	ASTM D-3289-03	1.70	1.70
Compressive Strength		ASTM C-109	16,000 psi	110 MPa
Hardness	(Shore D)	ASTM D-2240	85+	85+
Thin Film Water Absorption	(Saturated)	ASTM D-570	0.85 %	0.85 %
Dielectric Strength	(Oil)	ASTM D-149	485 volts/mil	19 volts/micron
Resistance to Acids & Alkalies		ASTM C-581	Excellent	Excellent
Adhesion to				
FBE		ASTM D-4541	3,280 psi	22 MPa
Bare Steel		ASTM D-4541	3,850 psi	26 MPa
Impact Resistance	(40 mils thickness)	ASTM G-14-88	66 inch lbs	7.7 Joules (7.7 Nm)
Flexibility	(@ -18°C (0°F))	NACE RP-0394	0.75 °	0.75 °
Tabor Abrasion	(CS-17 wheel, wear cycles)	ASTM D-4060-95	1,250 cycles/mil	49 cycles/micron
Cathodic Disbondment				
55°C (130°F)	30 days	ASTM G-95	0.33 inch	8.5 mm
50°C (122°F)	90 days	ASTM G-95	0.63 inch	16.0 mm
60°C (140°F)	28 days	CSA Z245.20-06	0.16 inch	4.1 mm
Holiday Detection	Holiday free	ISO :21809-3 & CSA Z245.20 ASTM G 62 Method B	125 Volts per mil 84 Volts per mil	5 Volts per micron 3.3 Volts per micron

### Product Selection Guide

Maximum Operating Temp	60°C (140°F)	Color	Brown
Compatible Line Coatings	FBE, CTE	Typical Single Coat Thickness	
Mixing Ratio		Manually Applied	20 mils (0.5 mm)
By Volume	4.8:1 Part A to B	Spray Applied	20 mils (0.5 mm)
By Weight	100:11.2 Part A to B	Recoat Interval (Spray)	
Surface Profile Recommended	2.5 - 4.0 mils	@ 21°C, 70°F	26 - 83 minutes
	63.5 - 101.6 microns	@ 65°C, 150°F	7 - 10 minutes
Surface Preparation	SA 2 1/2	Clean Up	Acetone, MEK
	SSPC-10 - Near-White		
	SSPC-SP5 - White		

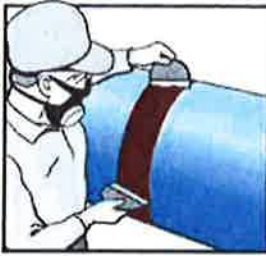
## Typical Application

**Powercrete® J**

Hand Apply

Spray Apply

Waste Factor



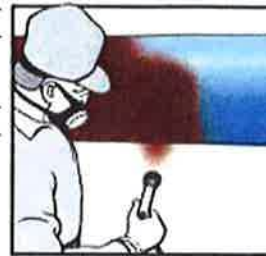
### Theoretical Coverage Rates

425 mil-sq. ft./litre  
1605 mil-sq. ft./US gallon  
1.0 mm-m<sup>2</sup>/litre

### Recommended Tip Sizes

Tip Size	Pipe Size (DN) to 12" (DN300)	Flow Rates (approx.)
331		19tip = 1.1 L / min.
419/431	12"-16" (DN300-400)	31tip = 2.8 L / min.
519/531	16"-24" (DN400-600)	
619/631	24"-48" (DN600-1200)	

Note: Fluid pressure at tip  
Approx. 3,500 psi.



(approx.)

Waste Factor	Kit Application
10%	20" + pipe OD
15%	14"-18" pipe OD
25%	2"-12" pipe OD
35%	

## Temperature Considerations

If the surface to be coated is below 10°C (50°F), preheating of the substrate is recommended. Preheat temperatures should not exceed 93°C (200°F) prior to the application.

Note: The application should only be done when the temperature of the steel is at least 3°C (5°F) higher than the dew point, as recommended by NACE.

## Storage & Handling

For optimum performance, store Powercrete® J epoxy products in a dry, well-ventilated area. Maintain products in original packaging and sealed until just before use. Avoid exposure to direct sunlight, rain, snow, dust or other adverse environmental conditions or contaminants.

**NOTE:**

Avoid prolonged storage at temperatures above 40°C (104°F) or below 5°C (40°F).

## Cure Times

Pot Life: 4 Lbs (1.8 Kg) Kit, @ 25°C (77°F)	20 minutes
Spray Application	
Gel Time: 20 mils, @ 27°C (80°F)	30 minutes
Dry Time: 20 mils, @ 27°C (80°F)	105 minutes
65 Shore "D" Reading: 20 mils, @ 27°C (80°F)	4.20 hours
75 Shore "D" Reading: 20 mils, @ 27°C (80°F)	5.20 hours
Application Temp Range:	-30 to 100°C -20 to 212°F
Shelf Life (stored in specified conditions):	2 years

## Ordering Information

Powercrete® J comes is available in three (3) packaging options:

**Drum**

Part A: 40 Gal / 153 Ltr (600 Lbs / 272 Kg)  
Part B: 50.7 Gal / 192 Ltr (419 Lbs / 190 Kg)

**Pail**

Part A: 5 Gal / 19 Ltr (75 Lbs / 34 Kg)  
Part B: 4.8 Gal / 18 Ltr (40 Lbs / 18 Kg)

**Kit Options:** (Part A and B in proper mix ratio by weight)

1.4 Gal / 5.4 Ltr (20 Lbs / 9 Kg)  
0.7 Gal / 2.7 Ltr (10 Lbs / 4.5 Kg)  
0.3 Gal / 1.1 Ltr (4 Lbs / 1.8 Kg)  
0.14 Gal / 0.5 Ltr (2 Lbs / 0.9 Kg)



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