



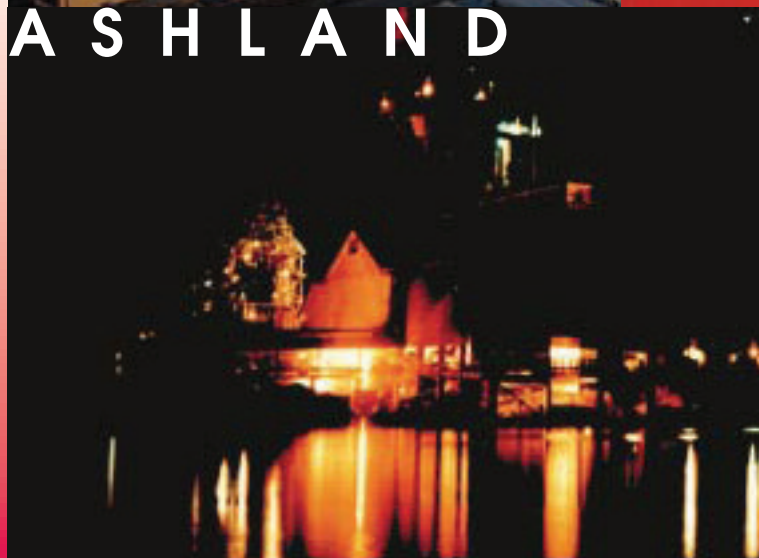
# CARBON STEEL PRICE BOOK

ROCKPORT



MIDDLETOWN

ASHLAND



THE FUTURE OF FLAT-ROLLED STEEL  
[WWW.AKSTEEL.COM](http://WWW.AKSTEEL.COM)

# General Information

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## INTRODUCTION

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This AK Steel Corporation Price Book contains our official published price list for Carbon Flat Rolled Products. Product information is true and, to the best of our knowledge, exact, but may not define the complete range (gauge, size, etc.) of products we manufacture. For specific product availability, please contact our Customer Service Center at 1-800-331-5050.

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## PRICE BUILDUP

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Price base refers to the base product as described in each product section. All extras are in dollars per 100 pounds and are to be added to the price base. Each extra is separate and distinct and does not include or absorb any other extra (unless specifically stated). Extras will extend only through the second decimal, which will be increased \$0.01 when the third decimal is \$0.005 or more. Freight charges will be based upon actual scale weight. All prices listed are F.O.B. our producing mill.

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## GENERAL CONDITIONS

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Our price bases and extras are based upon our standard method of production. If other methods of manufacture are required, additional extras, not listed herein, may apply. Price bases and extras are subject to change without notice. Unless otherwise negotiated, billings will reflect prices in effect at time of shipment. Our specific conditions of sale are detailed on all official sales correspondence such as quotations, contracts, order acknowledgements, and are also, for your convenience, included on pages 2.1 through 2.4 of our Conditions of Sale section.

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## CREDIT TERMS

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All orders are subject to approval by our Credit Department. Credit terms on all flat rolled steel products produced by AK Steel, except as noted below or as otherwise specified by the Credit Department, are currently Net 30, 1/2%-10.

The 1/2% cash discount is computed from the value of the material at the mill before any adjustment is made for freight.

The discount period is computed from the invoice date.

## Other Terms

1. Net 40, 1/2%-20 These terms are assigned to orders shipped via barge. Terms are applied to both barge load and pool barge quantities. 1/2% cash discount is allowed if invoice is paid with-in 20 days after the invoice date. Otherwise, the invoice is due on a net basis 40 days after the invoice date.
2. Net 45, 1/2%-25 These terms are assigned to orders shipped via rail to customers located on the West Coast (California, Oregon, Washington). 1/2% cash discount is allowed if the invoice is paid within 25 days after the invoice date. Otherwise, the invoice is due on the net basis 45 days after the invoice date.
3. Terms for all tool charges are Net Cash upon receipt of the invoice.
4. Terms for labor charges are Net 30 days.

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## TRADEMARK/COPYRIGHT

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15 Cr-Cb®	DR®	311 DQ™
15-5 PH®	ELECTRASMOOTH®	17-14 Cu Mo™
17-4 PH®	GREYSTONE®	1 SR™
17-7 PH®	LITE CARLITE®	2 SR™
AK & Design®	LR®	6 SR™
AK COATINGS®	NITRONIC®	12 SR™
AK FORMTUBE®	PAINTGRIP®	18 SR™
AK STEEL® (Block Letters)	PH 15-7 MO®	18-9 LW™
AK STEEL & Design®	T2®	AK-SPECTRA™
AK STEEL & Design® (Two Line Version)	TRAN-COR®	ANTI STICK™
ALUMI-THERM®	ULTRA FORM®	BORON STEEL™
AQUAMET®	ULTRASMOOTH®	CEM™
ARMCO®	UNIBRITE®	FORMABLE™
ARMCO & Design®	UNIVIT®	HCR™
CARLITE®	VIT-PLUS®	HIGH PERFORMANCE-10™
DI-MAX®	ZINCGRIP®	ORIENTED L5™
	11 Cr-Cb™	ULTRACHEM™
	18 Cr-Cb™	

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## WARRANTY STATEMENT

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The information and data presented in this Price Book are typical of average values and not a guarantee of maximum, minimum or actual values. Materials specifically suggested for applications described herein are made solely for the purpose of illustration to enable the reader to make his own evaluation. While the information is believed to be technically correct, **AK Steel disclaims all warranties, expressed or implied, including but not limited to, any warranty as to its suitability for any general or particular use. AK Steel will not be liable for any damages of any kind arising out of or relating to the use of or the inability to use the information provided, including but not limited to, ordinary, special, incidental, exemplary or consequential damages, whether based upon contract, tort or any other legal theory, whether foreseeable or not, and even if AK Steel has been advised of the possibility of the damages.**

# Conditions of Sale

## 1. Acceptance

Any Seller price quotation or pricing letter is for customer information only. Seller shall be bound only upon written confirmation of acceptance of an order at Seller's principal office (address is shown on the face hereof). ALL CUSTOMER ORDERS AND ACCEPTANCES ARE EXPRESSLY CONDITIONED UPON ASSENT TO THE TERMS AND CONDITIONS PRINTED HEREON AND IN ANY CONTRACTUAL SUPPLY AGREEMENT THAT MAY HAVE BEEN EXECUTED BY SELLER AND BUYER. TERMS ADDITIONAL TO OR DIFFERENT FROM THOSE IN THESE CONDITIONS OF SALE OR IN ANY CONTRACTUAL SUPPLY AGREEMENT ARE REJECTED. The Customer and Seller agree that the terms and conditions printed hereon are accepted in good faith by both parties as the controlling and final terms and conditions. Customer and Seller further agree that there should not be a "battle of forms" as described in Section 2-207 of the Uniform Commercial Code. Seller's commencement of performance is not to be construed as acceptance of any of Customer's terms or conditions. Seller may commence performance in reliance on Customer's acceptance of these Conditions of Sale.

## 2. Limited Warranties

THERE ARE NO UNDERSTANDINGS, TERMS, CONDITIONS OR WARRANTIES NOT FULLY EXPRESSED HEREIN. Seller warrants title to and freedom from encumbrance of the products. Seller also warrants that products described or referred to on the face hereof are of merchantable quality and conform in material respect to specifications accepted in writing by Seller. There are no warranties, express or implied, with respect to products sold hereunder which are misused, abused, or operated on mechanical equipment improperly designed or maintained or which are used, supplied for use or made available for use in any nuclear application of which Seller has not been notified in writing by Customer at the time of Customer's offer for the products sold hereunder. SELLER MAKES NO OTHER WARRANTY WHATSOEVER, EXPRESS OR IMPLIED. ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY SELLER AND EXCLUDED FROM THIS AGREEMENT.

## 3. Limitation of Customer's Remedies

Except as further specifically limited by paragraph 6 below, Seller's liability hereunder shall be limited to the obligation to repair or replace only those portions of products proven to have failed to meet in material respect the specifications on the Seller's Order Acknowledgment or Invoice or to have been defective in quality or workmanship at the time of delivery. Alternatively, Seller may allow credit therefor, at its option. Seller's total cumulative liability in any way arising from or pertaining to any product sold to Customer shall NOT in any case exceed the purchase price paid by Customer for such product. IN NO EVENT SHALL SELLER HAVE ANY LIABILITY FOR COMMERCIAL LOSS, CLAIMS FOR LABOR, OR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY TYPE, WHETHER CUSTOMER'S CLAIM BE BASED IN CONTRACT, TORT, WARRANTY, OR STRICT LIABILITY, OR OTHERWISE. IT IS EXPRESSLY AGREED THAT CUSTOMER'S REMEDIES EXPRESSED IN THIS PARAGRAPH ARE CUSTOMER'S EXCLUSIVE REMEDIES.

**4. Limitation of Liability for Delay** IN NO EVENT SHALL SELLER BE LIABLE FOR ANY CLAIMS FOR LABOR OR FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES OR ANY OTHER DAMAGES RESULTING FROM DELAY IN DELIVERY. NO DELIVERY DATES ARE GUARANTEED.

**5. Force Majeure** In any event and in addition to all other limitations stated herein, Seller shall not be liable for any act, omission, result or consequence, including but not limited to any delay in delivery or performance, which is (i) due to any act of God, the priority of any government order, any order bearing priority rating or order placed under any allocation program (mandatory or voluntary) established pursuant to law, local labor shortage, fire, flood or other casualty, governmental regulation or requirement, shortage or failure of raw material, supply, fuel, power or transportation, breakdown of equipment, or any cause beyond Seller's reasonable control whether of similar or dissimilar nature to those above enumerated, or (ii) due to any strike, labor dispute, or difference with workers, regardless of whether or not Seller is capable of settling any such labor problem.

**6. Nuclear Application Exclusion** It is expressly understood and agreed that Customer will not use, cause to be used or make available for use the product(s) described on the face hereof in any nuclear application including, but not limited to, use in connection with any nuclear reactor, any nuclear power generating system or any nuclear waste (or spent fuel) disposal project, unless written notice of the specific proposed or intended nuclear application has been given to Seller at the time of Customer's offer for the product(s). Unless such notice has been given, any subsequent nuclear application of the product(s) is wholly unauthorized and shall be deemed to be unknown to, unforeseeable to and unintended by Seller. UNLESS SUCH NOTICE HAS BEEN GIVEN, CUSTOMER SPECIFICALLY AGREES THAT, AS TO NUCLEAR APPLICATIONS, THE PRODUCT(S) FURNISHED BY SELLER ARE FURNISHED WITHOUT ANY WARRANTIES WHATEVER, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IT IS FURTHER SPECIFICALLY AGREED THAT WITH RESPECT TO ANY NUCLEAR APPLICATION OF THE PRODUCT(S) FOR WHICH SUCH NOTICE HAS NOT BEEN GIVEN, CUSTOMER WAIVES ALL REMEDIES AND ANY CLAIM, WHETHER IN CONTRACT OR IN TORT, INCLUDING ANY STATUTORY OR COMMON-LAW CLAIM FOR CONTRIBUTION OR INDEMNIFICATION, AGAINST SELLER, AND WILL INDEMNIFY AND HOLD SELLER HARMLESS.

**7. Passage of Title** Title to the products sold hereunder shall pass upon delivery to the carrier at the point of shipment. Neither Customer nor the consignee shall have the right to divert or reassign such shipment to any destination other than specified in the bill of lading without permission of the Seller. Unless otherwise agreed Seller reserves the right to select the mode of transportation.

## **8. Payments and Interest on Past Due Accounts**

Customer represents that Customer is solvent and can and will pay for the products sold to Customer in accordance with the terms hereof. If Customer shall fail to comply with any provision or to make payments in accordance with the terms of this contract or any other contract between Customer and Seller, Seller may at its option defer shipments or, without waiving any other rights it may have, terminate this contract. All deliveries shall be subject to the approval of Seller's Credit Department. Seller reserves the right before making any delivery to require payment in cash or security for payment, and if Customer fails to comply with such requirement, Seller may terminate this contract. An interest charge of 1-1/2% monthly (18% annual rate) or the maximum allowed by state law will be imposed on all past due accounts.

## **9. Transportation Charges**

Delivered prices or prices involving competitive transportation adjustments shall be subject to appropriate adjustment to reflect changes in transportation charges including but not limited to fuel surcharges.

## **10. Claims by Customer**

Claims by Customer for shortage of products or for products damaged during shipment, storage, or processing must be made within ten (10) days of receipt by Customer. Any claim that the products received by Customer do not conform in material respect to the specifications on the face of Seller's Order Acknowledgment or Invoice must be made within sixty (60) days of receipt of shipment, which Customer and Seller agree is a reasonable time, or Customer's claims shall be barred. In addition, Seller must be given an opportunity to investigate the claim before Customer disposes of the material, or Customer's claim will be barred. Seller shall incur no liability for damage, shortages, or other cause alleged to have occurred or existed at or prior to delivery to the carrier unless Customer shall have entered full details thereof on its receipt to the carrier. A variation between Seller's and Customer's scale weight or theoretical weight determination up to 1% shall be a permissible variation.

## **11. Mechanical Properties; Chemical Analyses**

Any data referring to mechanical properties or chemical analyses are the result of tests performed on specimens obtained from specific locations of the product(s) in accordance with prescribed sampling procedures; any warranty thereof is limited to the values obtained at such locations and by such procedures. There is no warranty with respect to values of the materials at other locations.

## **12. Patents**

Seller shall indemnify Customer against attorneys' fees and any damages or costs awarded against Customer in the event any legal proceeding is brought against Customer by a third person claiming the material delivered hereunder in itself constitutes an infringement of any U.S. patent, provided Customer gives Seller prompt notice of any such suit being brought, gives Seller the opportunity to defend any such suit, and cooperates with Seller with respect to any such defense, unless the material is made in accordance with materials, design, or specifications required by Customer, in which case Customer shall similarly indemnify Seller.

## **13. Permissible Variations**

. The products sold hereunder shall be subject to Seller's standard manufacturing variations, tolerances and classifications, all of which are available at Seller's website; [www.aksteel.com](http://www.aksteel.com)

- 14. Technical Advice** Seller shall not be responsible for results of any technical advice in connection with the design, installation or use of the products sold hereunder.
- 15. Taxes** No tax imposed in respect to the sale of the products sold hereunder is included in any quotation by Seller. Any such tax shall be added to and paid by Customer as part of the purchase price.
- 16. Seller's Right of Termination** If this contract is made in compliance with any governmental rule or regulation, plan, order or other directive, upon the termination thereof, Seller shall have the option of canceling this contract in whole or in part.
- 17. Waiver** Failure or inability of either party to enforce any right hereunder shall not waive any right in respect to any other or future rights or occurrences.
- 18. Surcharges** Surcharges will be Seller's surcharges in effect at time of shipment.
- 19. Conflicting Provisions Offered by Customer** Any terms and conditions of any purchase order or other instrument issued by the Customer in connection with the subject matter of this contract, which are in addition to or inconsistent with the terms and conditions expressed herein, will not be binding on Seller in any manner whatsoever unless accepted by Seller in writing.
- 20. Statute of Limitations** The Customer and Seller agree that any action for a breach of contract, including any action for a breach of warranty, must be commenced within one (1) year after the cause of action accrues.
- 21. Severability** In case any provision of this contract shall be declared invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired.
- 22. Applicable Law** This contract shall be governed by, and construed and enforced in accordance with, the laws of the State of Ohio. Customer and Seller specifically agree that any legal action brought relating to this contract will be brought and tried exclusively in the federal district court in Cincinnati, Ohio, or, in the absence of jurisdiction, exclusively in the Butler County Court of Common Pleas in Hamilton, Ohio.
- 23. Confidentiality** The price and terms of this contract are confidential and may not be disclosed by Customer without the prior written consent of Seller.

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# General Product Information

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## **STEEL QUALITY DEFINITIONS – COLD ROLLED, HOT ROLLED, ELECTRASMOOTH, AND ENAMEL**

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### **ASTM Specifications**

All products are manufactured to current ASTM specifications. These standards have been revised to reflect steel quality designations adding chemical compositions and typical mechanical properties.

### **Commercial Steel (CS Type A, B, or C)**

This quality is defined in ASTM Standards A 1008 for Cold Rolled, A 1011 and A 1018 for Hot Rolled and is equivalent to the former Commercial Quality. Sheets of this quality are suitable for applications where bending, moderate forming or drawing may be involved. Chemistry limits for CS Type B preclude the application of ultralow carbon material of this quality.

CS Type B is not recommended where a high degree of uniformity in mechanical properties is required.

Maximum ductility exists in Cold Rolled Sheets that are in an annealed last or “dead soft” condition, however, such sheets are not suitable for many applications because they will flute or stretcher strain. To prevent the occurrence of fluting or stretcher strain in forming or drawing, Cold Rolled Sheets are temper rolled, however, the effect of temper rolling is only temporary due to the phenomenon commonly known as aging. Effective roller leveling immediately prior to fabrication will minimize the tendency to flute or strain. Stocking of material for an extended period of time should be avoided. To eliminate the possibility of aging killed steel can be supplied but must be specified.

### **Drawing Steel Type B (DS Type B)**

This quality is defined in ASTM A 1008 for Cold Rolled and A 1011 and A1018 for Hot Rolled and is equivalent to the former DQSK. This quality has improved mechanical properties compared to CS and should be specified for fabrication of parts having stringent drawing requirements. Chemistry limits forbid application of ultralow carbon material to this quality. In addition to the improved formability, DS Type B is non-aging after it has been properly temper rolled.

### **Extra Deep Drawing Steel (EDDS)**

Steel of this quality is defined in ASTM Standard A 1008. Sheets of this quality should be specified when DS Type B will not provide a sufficient degree of ductility and drawability for the fabrication of parts having stringent drawing requirements. This quality is furnished as a vacuum degassed stabilized steel. It is non-aging and will not exhibit stretcher strain or fluting.

### **Extra Deep Drawing Steel Plus (EDDS+)**

Sheets of this quality should be specified for the most difficult parts having the most stringent drawing requirements. This quality is furnished as a vacuum degassed stabilized steel. It is non-aging and will not exhibit stretcher strain or fluting.

**Structural Steel (SS)**

Steel of this quality is defined in ASTM Standards A 1011 and A 1018 for Hot Rolled and ASTM A 1008 for Cold Rolled and is equivalent to the former Structural Quality. These products are produced to specified mechanical properties. The properties are obtained through control of carbon and manganese.

**High Strength Low Alloy Steel (HSLAS)  
High Strength Low Alloy Steel with Improved Formability (HSLAS-F)**

Steel of this quality is defined in ASTM Standards A 1011 and A 1018 for Hot Rolled and ASTM A 1008 for Cold Rolled and is equivalent to the former High Strength Low Alloy Steel. These products are produced to specified mechanical properties by additions of columbium.

**Specified Hardness**

For some applications, customers chose to specify a minimum, maximum or a range of Rockwell hardness (minimum of 15 pt. range). When ordering this quality, chemistry cannot be specified. All ranges may not be available. Orders for specified hardness will not be accepted for gauges < 0.026" due to testing variability.

**Specified Mechanical Properties**

Applications that require specific mechanical properties that are not covered by Industry/Society standards, or customer specification, agreed to mechanical properties must be met.

**Bake Hardenable**

Steel of this quality is specified when a customer requires a steel that increases in strength from blank to finished part through a combination of work hardening during part forming and strain aging during subsequent thermal processing.

**Dent Resistant**

Steel of this quality are conventional low carbon or ultralow carbon that are alloyed and processed to increase their strength level to achieve minimum strengths.

**Enamel Steel**

Defined in ASTM A 424. Only CS, DS and I-F Enamel Steel are available.

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**STEEL QUALITY DEFINITIONS – HOT DIP COATED**

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**ASTM Specifications**

All products are manufactured to current ASTM specifications. These products (ZINCGRIP, Aluminized Type 1, and Aluminized Type 2) are produced in quality designations defined in the appropriate ASTM standards. These standards are:

ASTM A 653 - ZINCGRIP Steel

ASTM A 463 - Aluminized Steel Type 1 and Type 2

These standards have been revised to redefine steel quality designations adding chemical compositions and typical mechanical properties. Not all quality designations are available in every product.

**Commercial Steel (CS)  
(Type A, B, or C)**

Sheets of this quality are equivalent to the former Commercial Quality and are suitable for the same types of applications. ZINCGRIP and Aluminized are subject to strain and fluting unless supplied as an extra smooth or temper rolled product; however, Commercial Steel may also exhibit the phenomenon of aging. There are three types of Commercial Steels defined in the ASTM standard each one having specific chemistry and typical mechanical property ranges. See individual AK products for available types.

**Deep Drawing Steel (DDS)**

Sheets of this quality are equivalent to the former Drawing Quality Special Killed. This grade may be produced from either low carbon aluminum killed steel or interstitial free stabilized steel at the producers option. Objections to the use of stabilized steel must be included in customer order requirements.

**Extra Deep Drawing Steel (EDDS)**

Sheets of this quality provide a degree of ductility and drawability for the fabrication of parts having stringent drawing requirements. The grade requires use of interstitial free stabilized steel.

**Extra Deep Drawing Steel Plus (EDDS+)**

Sheets of this quality should be specified for the most difficult parts having stringent drawing requirements. This grade requires the use of interstitial free stabilized steel.

**Structural Steel (SS)**

These products are produced to specified mechanical property ranges as designated in the ASTM standard. The properties are obtained through control of carbon and manganese.

**High Strength Low Alloy Steel (HSLAS)**

The products are produced to specified mechanical property ranges in the ASTM standard through the additions of microalloying elements.

**Specified Mechanical Properties**

Applications that require specific mechanical properties that are not covered by Industry/Society standards, or customer specification, agreed to mechanical properties must be met.

**Specified Hardness**

For some applications, customers chose to specify a minimum, maximum or a range of Rockwell hardness (minimum of 15 pt range). When ordering this quality, chemistry cannot be specified. All ranges might not be available. Orders for specified hardness will not be accepted for gauges < 0.026 due to testing variability.

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**TEST REPORTING**

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Test data can be supplied by a number of different means.

Standard ladle analysis is the chemical analysis of a heat of steel and is supplied on the corresponding AK Steel Load Tally and Shipping Tag for each shipped coil.

Test Reports/Certifications can be supplied when reporting test data for specification compliance. Standard test reports include mechanical properties, ladle chemistry, and coating weight tests. This data can be supplied in either English or metric units utilizing ASTM or JIS test methods. The data can also be supplied on the load tally if required.

A limited amount of test information can also be included on the Shipping Tag. This includes ladle analysis, mechanical properties, and coating weight.

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## CLAIM POLICIES

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### General

The purpose of our claim policy is to support our customer's manufacturing performance. This requires thoughtful cooperation in settling claims. Steel determined to be unusable because of mill related reasons should be set aside for review with the appropriate AK Steel personnel. This includes blanks, cut lengths, coils or slit mults from coils. When an individual coil or slit mult contains an apparent high frequency of mill imperfections, it should be set aside only after a minimum of 10% of the coil has been processed.

Material tested and certified to meet an agreed upon specification for mechanical or physical properties is done under guidelines outlined by ASTM or JIS testing requirements. Material and testing variations may result in disputes over material conformance. In such cases, samples from the area of suspected non-conformance must be secured for AK Steel to verify compliance. Also of note, material is to be tested in the quarter position of the width in the manner prescribed by the specification or determined by the producing mill if no such specification requirement exists.

The customer can expect 98% satisfactory product in coil shipments of Carbon Sheet Steel products and 97% satisfactory product in coil shipments of High Strength Sheet products. If, because of coil ends or mill related imperfections, these standards are not met, a claim for the value of the material will be honored after review by appropriate AK Steel personnel.

Exception: The Hot Rolled base product is, by definition, shipped without further processing, therefore, the customer must accept without claim, a maximum of 15 feet on either end of a coil that exceeds gauge or width tolerances.

Some customers statistically evaluate production line performance, i.e. breakage and line scrap. When negotiated prior to order acceptance, AK Steel will recognize fair and reasonable line performance standards such as SAE J424 - "Method for Determining Breakage Allowance for Sheet Steel."

### Coil Breaks

These guidelines reference breaks across the width of the coil caused by discontinuous yielding of the strip as it processes.

Any processing that recoils on ID diameters less than 24" are not covered by these guidelines.

#### HR

- HR Bands off of the Hot Strip Mill are subject to coil breaks upon recoiling (regardless of grade applied).
- Coil break-free HR requires Temper Rolling (with "coil breaks objectionable").

#### CR/EG/Enameling Steels

- Properly processed EDDS/EDDS+ (I-F steel) is not subject to coil breaks in an as-received condition or during subsequent processing.
- Because of equipment configuration and geometry there is a potential for coil breaks on material over 0.060" (1.5mm) thickness on CS-B and DS Type B and UNIVIT in the as-received condition.

## ZG/GA/AL

- Properly processed EDDS and EDDS+ (I-F substrate) coils are not subject to coil breaks after coating in an as-received condition or during subsequent processing.
- Properly processed DDS with a low carbon substrate (A-grade) is not subject to coil breaks after coating-box anneal – temper rolling during subsequent processing. However, due to roll diameter on the delivery section of the galvanized line, at coil thicknesses above 0.060" (1.5mm) the coil coming off of the coating line may contain coil breaks. These breaks will be "smoothed/masked" during temper rolling, but may still be visible in the as-received coil.
- "ULTRASMOOTH" and "EXTRASMOOTH" are (along with "Temper Rolled" on "Min Spangle"\* finish) required to minimize the risk of coil breaks during subsequent processing on coils with a low-carbon (A-grade) substrate. Again, a low-carbon coil above 0.060" (1.5mm) thickness may contain smoothed/masked coil breaks in the as-received condition.
- CS Type B Min Spangle coils are subject to coil breaks/leveler breaks in the as-received condition and during subsequent processing. An "ULTRASMOOTH", "EXTRASMOOTH", or "Temper Rolled" finish is required to minimize coil breaks during subsequent processing. This effect is temporary due to this grade being prone to aging (typical YPE return is 45 days). In thickness above 0.060" (1.5mm) there may be smoothed/masked coil breaks from the exit end of the coating line still visible on these finishes.

\*Aluminized does not have "Min Spangle" or "ULTRASMOOTH" designations.

## Rust

Discoloration and stain are inherent hazards when moisture, including in-transit weather condensation; accumulates between laps of coils or between sheets. AK Steel Corporation will not consider either deferred or immediate claims for rust:

1. When material is ordered dry or without suitable surface treatment.
2. When orders specify packaging without at least the minimum protection.
3. When material is stored outdoors or not protected against moisture or sudden temperature change.

Note: If the material arrives and the coil temperature is below the dew point of the coil storage facility, do not unpackage the coil until the coil reaches ambient temperature.

AK Steel will consider claims for wet storage stain only if the following requirements have been met in normal transit:

1. Material is ordered Chemical Treated, Chemical Treated and Oiled, or Oiled.
2. Material is ordered with at least minimum weather protection. This minimum weather protection includes complete wrapping with water proof paper on coils and sheets or coil master stretch wrap packaging on coils for truck and close rail car shipments.
3. All shipments are inspected immediately for moisture on the package. If evident, a notation of the condition must be made on the shipping papers in the presence of the steel hauler and the carrier notified. For material sold FOB Mill, a claim should be filed against the carrier and the AK Steel Corporation Sales Office notified.

4. If no moisture is evident on the outside packaging, the steel is inspected immediately for moisture on in-transit condensation. If present, a complaint is presented immediately.

## **Freight Claims**

These guidelines are intended to help clarify the proper procedures for handling claims for material damaged or lost in transit. Complete understanding of the following points by personnel involved in receiving and claim processing will improve communications with carriers and may help to expedite the settlement of claims. The consignee must accept all shipments unless the goods are valueless. Goods which have a scrap value may not be valueless. Refusal to accept goods invokes Section 4 of the Bill of Lading contract, and the consignee may be found to be in default of the contract of sale, resulting in back charges. Photographs of damaged goods are helpful for settling claims quickly, especially if the damaged goods are photographed in place on carrier's equipment. The consignee must mitigate the loss by storing and protecting the goods from further deterioration and assist in the repair and salvage unless carrier agrees that goods are valueless. All costs can be claimed. Loss and/or damage can be either visible on delivery to the consignee or concealed and not discovered for an indeterminate length of time. Each situation requires a specific method of handling as previously outlined. Loss and/or damage claims must be filed with appropriate claim agent of the delivering carrier within 9 months after delivery of material. When shipments are made F.O.B. origin, the buyer files the claim. When shipment is made F.O.B. destination, the seller files the claim. A formal claim must include the following:

1. Original Bill of Lading or Bond of Indemnity
2. Original paid Freight Bill or Bond of Indemnity
3. Pricing letter stating cost of material.
4. Delivery receipt with loss and/or damage notation (motor carrier only)
5. Inspection report
6. Itemized statement of all loss and/or damage costs including mitigation costs
7. Photographs, if available
8. Any other supporting documents

For further assistance, contact your AK Steel Corporation Representative.

## **Claims Exceptions**

Full Hard Cold Roll is provided directly off the Cold Mill unless further processing is stipulated by the customer. This product is shipped with off gauge coil ends and thus is not subject to the yield standards established for sheet mill products having additional processing.

## GUIDELINES

### Coil Weight

A full weight coil is any coil weighing more than 80% of the specified maximum coil weight which is negotiated with the customer on the basis of our normal production practice. Up to 20% of the ordered item quantity may include light weight coils. A light coil being any coil between 50% and 80% of the specified maximum coil weight. Normal production practice requires that for "no weld" orders or small order quantity orders acceptance is based on minimum order quantities as stated on pages 3.10 and 3.11.

### Weld Restrictions

Under certain circumstances, customer processing requirements or ultimate end use will involve removal of pickle line welds from cold reduced coils. As these circumstances are confirmed the extra processing step is performed to remove the weld. Consult your AK Steel representative for restrictive weld capability.

### Permissible Variation From Ordered Quantity

#### All Products Except Hot Rolled

Items of 80,000 and over . . . . .5% over or 5% under  
 Items of 80,000 thru 40,000 . . . . .10% over or 5% under  
 Items of 40,000 thru 20,000 . . . . .15% over or 10% under

#### Hot Rolled Products Only

Items of 80,000 and over .....10% over or 10% under  
 Items under 80,000 thru 40,000 .....15% over or 15% under  
 Items under 40,000 thru 20,000 .....20% over or 20% under

## TOLERANCE TABLES

UNIVIT, IF Enameling Steel, VIT-PLUS, Cold Rolled Sheet, ZINCGRIP ELECTRASMOOTH

### Specified Thickness Tolerances

Width (inches)	Thickness (inches)					
	Over 0 to .019	Over .019 to .039	Over .039 to .057	Over .057 to .071	Over .071 to .098	Over .098 to .142
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>					
Over 0 to 72	.002	.003	.004	.005	.005	.006
Over 72	.002	.003	.004	.005	.006	.007
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>					
Over 0 to 72	.001	.002	.002	.002	.002	.003
Over 72	.001	.002	.002	.002	.003	.004

Thickness is measured at any point on the sheet not less than 1 inch from an edge. This table is the restricted ASTM thickness tolerance standard.

Width (mm)	Thickness (mm)				
	Over 0 to .4	Over .4 to 1.0	Over 1.0 to 1.2	Over 1.2 to 2.5	Over 2.5 to 4.0
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>				
Over 0 to 1800	.05	.08	.10	.12	.15
Over 1800	.06	.08	.10	.15	.18
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>				
Over 0 to 1800	.03	.04	.05	.06	.08
Over 1800	.03	.04	.05	.08	.08

## Specified Width Tolerance

## Coils and Cut Lengths

Width/(inches)	All Gauges	Width/(mm)	All Gauges
Over 0 to 2	–	Over 0 to 50	–
Over 2 to 6	.012	Over 50 to 100	.3
Over 6 to 9	.016	Over 100 to 200	.4
Over 9 to 12	.032	Over 200 to 300	.8
Over 12 to 30	.125	Over 300 to 600	3
Over 30 to 48	.1875	Over 600 to 1200	5
Over 48 to 60	.25	Over 1200 to 1500	6
Over 60 to 80	.3125	Over 1500 to 1800	8
Over 80	.375	Over 1800	10

Tolerance over specified width – no tolerance under.

## Camber

Widths over 12 inches maximum 1 inch in any 20 feet of length.

## Flatness Tolerances

Specified Width (inches)	Thickness (inches)			
	Minimum to .044	Nominal to .046	Minimum over .044	Nominal over .046
to 36	.375	.375	.250	.250
Over 36 to 60	.625	.625	.375	.375
Over 60 to 72	.875	.875	.625	.625
Over 72	.875	.875	.875	.875

Sheets not specified to restricted flatness. Maximum deviation from a horizontal flat surface. The above table applies to sheets cut to length by the customer from coils when adequate flattening operations are performed. It does not apply when product is ordered full hard or to a hardness range.

## TOLERANCE TABLES

Aluminized Type I, Aluminized Type II, ZINCGRIP, ZINCGRIP GA

## Specified Thickness Tolerances

Width (inches)	Thickness (inches)					
	Over 0 to .023	Over .023 to .043	Over .043 to .061	Over .061 to .075	Over .075 to .101	Over .101 to .187
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>					
Over 0 to 32	.003	.004	.005	.006	.007	.008
Over 32 to 40	.003	.004	.005	.006	.008	.008
Over 40 to 60	.003	.004	.005	.006	.008	.009
Over 60	.003	.004	.005	.006	.009	.009
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>					
Over 0 to 32	.002	.002	.002	.003	.004	.004
Over 32 to 40	.002	.002	.002	.003	.004	.004
Over 40 to 60	.002	.002	.002	.003	.004	.005
Over 60	.002	.002	.002	.003	.004	.005

Thickness is measured on the coated sheet and includes the coating thickness. Thickness is measured at any point on the sheet not less than 1 inch from an edge. This table is the restricted ASTM thickness tolerance standard.

Aluminized Type I and Type II

Width (millimeters)	Thickness (millimeters)				
	Over 0 to 1.0	Over 1.0 to 1.5	Over 1.5 to 2.0	Over 2.0 to 2.5	Over 2.5 to 5.0
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>				
Over 0 to 1500	.10	.13	.15	.20	.23
Over 1500	.10	.13	.15	.23	.23
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>				
Over 0 to 1500	.05	.06	.08	.10	.12
Over 1500	.05	.06	.08	.12	.12

**Specified Thickness Tolerances**

Width (inches)	Thickness (inches)						
	Over 0 to .023	Over .023 to .043	Over .043 to .061	Over .061 to .075	Over .075 to .101	Over .101 to .109	Over .109 to .140
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>						
Over 0 to 32	.003	.004	.005	.006	.007	.008	.010
Over 32 to 40	.003	.004	.005	.006	.008	.008	.010
Over 40 to 60	.003	.004	.005	.006	.008	.009	.012
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>						
Over 0 to 32	.002	.002	.002	.003	.004	.004	.005
Over 32 to 40	.002	.002	.002	.003	.004	.004	.005
Over 40 to 60	.002	.002	.002	.003	.004	.004	.006

Thickness is measured on the coated sheet and includes the coating thickness. Thickness is measured at any point on the sheet not less than 1 inch from an edge. This table is the restricted ASTM thickness tolerance standard.

Width (millimeters)	Thickness (millimeters)					
	Over 0 to 1.0	Over 1.0 to 1.5	Over 1.5 to 2.0	Over 2.0 to 2.5	Over 2.5 to 2.7	Over 2.7 to 3.6
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>					
Over 0 to 1500	.10	.13	.15	.20	.23	.30
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>					
Over 0 to 1500	.05	.06	.08	.10	.12	.15

Aluminized  $\geq 110$ " min and  $\geq 2.8$  mm HR substrate will be used and HR tolerance will apply.

## Specified Width Tolerance

## Coils and Cut Lengths

Width (inches)	Tolerance Over, No Tolerance Under (inches)				Width (mm)	All Gauges
	to .068	Over .068 to .083	Over .083 to .110	Over .110		
Over 2 to 6	.008	.012	.016	.032	Over 0 to 50	-
Over 6 to 9	.016	.016	.032	.032	Over 50 to 100	.3
Over 9 to 12	.032	.032	.032	.032	Over 100 to 200	.4
Over 12 to 30	.125	.125	.125	.125	Over 200 to 300	.8
Over 30 to 48	.1875	.1875	.1875	.1875	Over 300 to 600	3
Over 48 to 60	.250	.250	.250	.250	Over 600 to 1200	5
Over 60	.3125	.3125	.3125	.3125	Over 1200 to 1500	6
					Over 1500	8

Tolerance over specified width inches — no tolerance under.

## Camber

Widths over 12 inches maximum 1 inch in any 20 feet of length.

## Flatness Tolerances

Specified Width (inches)	Thickness (inches)			
	Minimum to .048	Nominal to .050	Minimum over .048	Nominal over .050
to 36	.375	.375	.250	.250
Over 36 to 60	.625	.625	.375	.375
Over 60 to 72	.875	.875	.625	.625

Sheets not specified to restricted flatness. Maximum deviation from a horizontal flat surface. The above table applies to sheets cut to length by the customer from coils when adequate flattening operations are performed. It does not apply when product is ordered to a hardness range.

## SLAB CONVERSION TABLE – POUNDS PER SLAB

Width	ZINGRIP	Alum.	Terne	ELECTRASMOOTH	Cold Rolled Enamel	HRP Cut Edge Only
24.0000-25.8000		26,800	26,300		25,800	26,300
25.8001-27.8000		28,600	28,200		27,600	28,100
27.8001-29.7000		30,600	30,100		29,400	29,300
29.7001-31.7000	32,400	32,200	31,900		31,400	31,200
31.7001-33.7000	34,500	34,300	33,800		33,200	34,000
33.7001-35.6000	35,600	36,200	35,700		35,000	35,900
35.6001-37.6000	41,100	41,100	40,500	39,300	39,400	40,500
37.6001-39.6000	43,100	42,900	42,600	41,200	41,700	42,700
39.6001-41.6000	44,400	44,700	44,700	43,200	43,700	44,400
41.6001-43.5000	47,500	47,100	46,600	45,200	45,700	46,800
43.5001-45.5000	49,500	48,600	48,700	47,300	47,600	48,800
45.5001-47.5000	51,600	50,800	50,700	49,200	49,800	51,000
47.5001-49.4000	53,700	53,000	52,700	51,500	51,600	52,500
49.4001-51.4000	55,300	55,200	54,700	50,900	53,500	54,300
51.4001-53.4000	57,500	56,200		55,000	55,400	56,900
53.4001-55.4000	59,900	60,000		57,100	57,500	58,400
55.4001-57.3000	61,800	61,300		59,200	59,400	59,000
57.3001-59.3000	63,800	62,800		61,100	61,400	61,000
59.3001-61.3000	66,100	65,400		62,900	63,500	63,400
61.3001-63.2000	67,400			65,300	65,300	65,100
63.2001-65.2000	64,500			62,300	62,500	62,000
65.2001-67.2000	66,600			63,800	64,200	64,100
67.2001-69.1000	68,500			65,500	66,200	65,700
69.1001-71.1000	70,200			67,700	67,900	67,500
71.1001-73.1000	72,100			69,300	69,700	69,400
73.1001-75.1000	74,200			71,700	71,500	71,100
75.1001-77.1000	76,200			72,900	73,700	73,000

For Metric calculation – Multiply by 25.40

## SLAB CONVERSION TABLE – POUNDS PER SLAB

Mill Edge Only

Width	HR	HRP
25.0000-27.1000	27,300	26,000
27.1001-29.1000	29,200	27,400
29.1001-31.0000	31,700	29,200
31.0001-33.0000	33,000	31,000
33.0001-35.0000	35,400	33,500
35.0001-36.9000	36,800	35,300
36.9001-38.9000	41,900	39,300
38.9001-40.9000	44,600	42,800
40.9001-42.9000	46,100	44,000
42.9001-44.8000	48,700	46,900
44.8001-46.8000	50,200	47,200
46.8001-48.8000	52,800	49,500
48.8001-50.7000	54,800	52,900
50.7001-52.7000	57,200	54,100
52.7001-54.7000	58,500	56,400
54.7001-56.6000	60,400	58,200
56.6001-58.6000	62,600	60,000
58.6001-60.6000	65,200	61,000
60.6001-62.6000	67,300	64,100
62.6001-64.5000	68,100	66,200
64.5001-66.5000	66,500	63,200
66.5001-68.5000	69,100	65,100
68.5001-70.4000	71,300	66,900
70.4001-72.4000	71,700	67,800
72.4001-74.4000	74,700	70,600
74.4001-76.4000	77,200	72,500
76.4001-78.3000	78,000	74,400

For Metric calculation — Multiply by 25.40

## SPECIFICATIONS AND STANDARDS DIRECTORY

Specification	Product	Grade/Quality	Applicable AK Steel Product
ASTM A 1008	Cold Rolled	CSTB, Structural Steel (SS), DSTB, HSLAS, EDDS, EDDS+	Cold Rolled, consult your AK Steel Representative
ASTM A 424	UNIVIT, VIT-PLUS, IF Enameling	CS, DS, EDDS for Porcelain Enameling	UNIVIT, VIT-PLUS, IF Enameling
ASTM A 463	Aluminized Steel T1 and T2	CSTB, DDS, EDDS, SS, HSLAS	AL-T1, AL-T2
ASTM A 568	Hot Rolled and Cold Rolled	General requirement	Hot Rolled and Cold Rolled
ASTM A 1011	Hot Rolled	CSTB, DSTB, SS, HSLAS	Hot Rolled, consult your AK Steel Representative
ASTM A 591	Electrogalvanized light coating	General coating requirement	Consult your AK Steel Representative
ASTM A 635	Hot Rolled	Heavy GA Hot Rolled & Conversion to plate	Hot Rolled
ASTM A 653	Galvanized and Galvannealed	CSTB, DDS, EDDS, EDDS+ SS, HSLAS	Galvanized and Galvannealed
ASTM A 659	Hot Rolled	Hot Rolled CS (carbon .16 to .25%)	Consult your AK Steel Representative
ASTM A 749	General requirement for HSLA Hot Rolled	HSLAS	Hot Rolled
ASTM A 755	H.D. metallic coated and painted for exposed building panels	SS, HSLAS	Painted AL-T2 or painted ZINCGRIP
ASTM A 794	Cold Rolled	CS carbon (.16 to .25%)	Cold Rolled
ASTM A 879	Electrogalvanized sheets	General coating requirement	ELECTRASMOOTH
ASTM A 917	Electrogalvanized general requirement	General coating requirement	ELECTRASMOOTH
ASTM A 918	Zn-Ni Electrogalvanized	General coating requirement	ELECTRASMOOTH Zn-Ni
ASTM A 924	ZINCGRIP and AL-T1	General requirement for Metallic Coated by the Hot Dip Process	ZINCGRIP and AL-T1
ASTM A 929	Hot dipped steel sheet for Corrugated Steel Pipe	General requirement	AL-T2 CSP (Culvert) Galvanized Culvert Sheets
ASTM A 1018	Hot Rolled	Hot Rolled heavy thickness, HSLAS	Hot Rolled
AASHTO M-218	Galvanized Culvert Sheets	Galvanized Culvert Sheets	Galvanized Culvert Sheets
AASHTO M-274	AL-T2 CSP (Culvert) Corrugated Steel Pipe	AL-T2 CSP Grade (1.00 oz. coating)	AL-T2 CSP (Culvert)
SAE J1392	Hot Rolled and Cold Rolled	High strength (Metric Units)	Consult your AK Steel Representative
SAE J2329	Hot Rolled, Cold Rolled and coated	Properties of Low Carbon Steels	Consult your AK Steel Representative
SAE J2340	Hot Rolled and Cold Rolled	High strength (Metric Units)	Consult your AK Steel Representative

For any standards or specifications not referenced here, consult your AK Steel Representative.

## SAE CHEMICAL COMPOSITION RANGES

	Carbon	Manganese	Phosphorus	Sulfur
1006	0.08 max	0.45 max	0.030	0.035
1008	0.10 max	0.50 max	0.030	0.035
1009	0.15 max	0.60 max	0.030	0.035
1010	0.08-0.13	0.30-0.60	0.030	0.035
1012	0.10-0.15	0.30-0.60	0.030	0.035
1015	0.13-0.18	0.30-0.60	0.030	0.035
1016	0.13-0.18	0.60-0.90	0.030	0.035
1017	0.15-0.20	0.30-0.60	0.030	0.035
1018	0.15-0.20	0.60-0.90	0.030	0.035
1019	0.15-0.20	0.70-1.00	0.030	0.035
1020	0.18-0.23	0.30-0.60	0.030	0.035
1021	0.18-0.23	0.60-0.90	0.030	0.035
1022	0.18-0.23	0.70-1.00	0.030	0.035
1023	0.20-0.25	0.30-0.60	0.030	0.035

Although the maximum amounts of phosphorus and sulfur are 0.030 and 0.035 percent, respectively, our normal practice produces significantly lower levels for both elements.

## OBSOLETE AND REPLACEMENT STANDARDS

The following is a cross reference of the obsolete ASTM Coating Standards with their current replacements.

ASTM A 525	ZG	General Requirements	ASTM A 924
ASTM A 526	ZG	CQ	ASTM A 653
ASTM A 527	ZG	LFQ	ASTM A 653
ASTM A 642	ZG	DQSK	ASTM A 653
ASTM A 446	ZG	Structural Quality	ASTM A 653
ASTM A 444	ZG	Galvanized Culvert Sheets	ASTM A 929
ASTM A 819	ALUM T-2	Corrugated Steel Pipe	ASTM A 929
ASTM A 366	CR	CSTB/CQ	ASTM A 1008
ASTM A 611	CR	Structural Quality/SS	ASTM A 1008
ASTM A 620	CR	DSTB/DQSK	ASTM A 1008
ASTM A 969	CR	EDDS	ASTM A 1008
ASTM A 607	CR	HSLA	ASTM A 1008
ASTM A 715	CR	HSLA-F Improved Formability	ASTM A 1008
ASTM A 569	HR	CS	ASTM A 1011
ASTM A 570	HR	Structural Steel	ASTM A 1011
ASTM A 622	HR	DS	ASTM A 1011
ASTM A 715	HR	HSLA with Improved Formability	ASTM A 1011
ASTM A 607	HR	HSLA	ASTM A 1011

## METRIC CONVERSION FACTORS

The following list contains the common metric and other conversions that may be applicable for purposes of ordering carbon steel sheet products.

	Convert From	Convert To	Multiply By
Length	inch (in)	millimeters (mm)	25.4
	foot (ft.)	meter (m)	0.3048
	inch (in)	mil	1000
	millimeters (mm)	inches	.03937008
	microinches	micrometer or micron	.0254
	micrometers or microns	microinch	39.37008
Weight	ounce (oz)	grams (g)	28.34952
	pound (lb)	grams (g)	453.5924
	pound (lb)	kilograms (kg)	0.4535924
	ton	metric ton	0.9071847
	metric ton	kilogram (kg)	1000
	metric ton	pounds (lb)	2205
	kilogram (kg)	pounds (lb)	2.204623
Coating Weight	ounce/square foot (oz/ft <sup>2</sup> )	grams/square meter (g/m <sup>2</sup> )	305.1517
	grams/square meter (g/m <sup>2</sup> )	ounces/square foot (oz/ft <sup>2</sup> )	.00327705
Density	pound/cubic inch (lb/in <sup>3</sup> )	grams/cubic centimeter (gm/cm <sup>3</sup> )	27.68
	grams/cubic centimeter (gm/cm <sup>3</sup> )	pounds/cubic inch (lb/in <sup>3</sup> )	.0361273
Strength	pounds/square inch (psi)	ksi (1000 psi)	0.001
	ksi	megapascal (MPa)	6.895
	pounds/square inch (psi)	megapascal (MPa)	0.006894757
	newton/square millimeter (N/mm <sup>2</sup> )	megapascal (MPa)	1
	pounds/square inch (psi)	newton/square millimeter (N/mm <sup>2</sup> )	0.006895
	ksi	newton/square millimeter (N/mm <sup>2</sup> )	6.895
	ksi	kilograms/square millimeter (kg/mm <sup>2</sup> )	0.704
	kilograms/square millimeter (kg/mm <sup>2</sup> )	pounds/square inch (lb/in <sup>2</sup> )	1422.334
	megapascal (MPa)	pounds/square inch (lb/in <sup>2</sup> )	145.0377
kilograms/square millimeter (kg/mm <sup>2</sup> )	megapascal (MPa)	9.80665	
Price	\$/100 pounds	\$/100 kg	2.204623
	\$/100 kg	\$/100 pounds	.4535924

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## STEEL QUALITY DESIGNATIONS

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### Hot Dip Coated (ZINCGRIP, and ALUMINIZED)

The following is the cross reference of the old ASTM quality designations to the new designations.

#### Old Designation

Commercial Quality  
Drawing Quality Special Killed  
Deep Drawing Quality Special Killed  
Extra Deep Drawing Quality  
Special Killed  
Structural Quality  
High Strength Low Alloy

#### New Designation

Commercial Steel Type B  
Deep Drawing Steel  
Extra Deep Drawing Steel  
Extra Deep Drawing Steel  
Plus  
Structural Steel  
High Strength Low Alloy Steel

The following are ASTM quality designations that AK Steel does not produce: Forming Steel Type A, and Forming Steel Type B. Inquire for substitutions.

### Hot Rolled, Cold Rolled, ELECTRASMOOTH, Enamel

#### Old Designation

Commercial Quality (HR, CR, EG)  
Commercial Quality (Enamel)  
Drawing Quality  
  
Drawing Quality  
  
Deep Drawing Quality  
  
Extra Deep Drawing Quality  
  
Extra Deep Drawing Quality  
  
Structural Quality (HR, CR, EG)  
High Strength Low Alloy

#### New Designation

Commercial Steel Type B  
Commercial Steel  
Drawing Steel Type B  
Special Killed (HR, CR, EG)  
Drawing Steel  
Special Killed (Enamel)  
Extra Deep Drawing Steel  
Special Killed (CR, EG)  
Extra Deep Drawing Steel Plus  
Special Killed (CR, EG)  
Deep Drawing Steel Type A  
Special Killed (HR)  
Structural Steel  
High Strength Low Alloy Steel  
(HR, CR, EG)

**Aging** Changes in mechanical properties that occur over time in low carbon steel causing the material to become stronger and less ductile and prone to strain.

**Annealing** A process involving high-temperature heating and cooling of the as-rolled cold rolled steel substrate to make it softer and more formable.

**Backer Coat** Usually refers to the coating on the reverse side of a prepainted sheet. The backer coating is generally not as narrowly specified with reference to its color, thickness and composition as is the topcoat.

**Camber** The deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight edge.

**Carbon Steel** Steel which owes its properties chiefly to carbon without substantial amounts of other alloying elements; also known as straight carbon steel or plain carbon steel. The maximum content for the following elements does not exceed the percentages noted: manganese 1.65, silicon .60, copper .60.

**Cast Analysis** (heat analysis) Chemical analysis representative of a specific heat of steel. (Ladle analysis is a deprecated term that is replaced by cast analysis.)

**Chemical Treatment** A passivating treatment applied to metallic coated products to retard formation of corrosion products (storage stain/rust).

**Coil Breaks** Creases or ridges in sheet that appear as parallel lines across the direction of rolling, and that generally extend the full width of the sheet or strip.

**Cold-Rolled Sheet** This is manufactured from hot-rolled descaled coils by cold reducing to the desired thickness, generally followed by annealing to recrystallize the grain structure. Cold-rolled sheet is manufactured from hot-rolled coils over 24 inches in width.

**Cold-Rolled Strip** This product is furnished in widths of 24 inches and narrower with specific temper, specific edge or specific finish to closer tolerances than cold-rolled carbon steel sheet.

**Color Standard** A painted sheet panel with a prescribed color of paint representing the precise color it is intended to produce in the prepainted sheet. A complete color standard definition will usually include painted panels representative of the limits of acceptable deviation from the precise standard color as well.

**Continuous Casting** A casting technique in which a slab is continuously withdrawn through the bottom of the mold as it solidifies.

**Conversion Coating** The chemical treatment film applied to the steel or metallic coated sheet prior to painting.

**Corrosion** Gradual chemical or electrochemical attack on a metal by atmospheric moisture or other agents.

**Crown** The thickness increases from an edge measurement to the center of a sheet.

**Cut Edge** Removes the hot mill edge. Coil ends will be cropped back to gauge when cut edge is ordered.

**Cut To Length** Ordered when specific or discrete lengths are desired.

**Deep Drawing** An extreme condition of drawing. The term “deep drawing” is commonly used to describe metal stamping operations which are a combination of drawing and severe stretching.

**Drawing** The shaping of a flat blank into a desired contour by causing the metal to flow over a draw ring and around a punch.

**Dry Film Thickness (DFT)** The thickness of the dry paint film.

**Ductility** The ability to be deformed plastically without fracture. In flat rolled steel, ductility is measured by mechanical properties in a tensile test.

**Elongation** The percent increase of a given distance (usually 2 inches) prior to fracture during tensile testing.

**Embossed Sheet** A sheet having a prominent, impressed texture or pattern on its surface(s). If the defined texture is applied to one surface only, it is most properly termed a coined surface.

**Extra Smooth Sheet** Product produced to sheet by temper rolling after coating to smooth the surface and impart resistance to stretcher strain.

**Finish Coat** The top coat or exposed prime side paint film.

**Flatness** Flatness is a measure of maximum deviation from a flat horizontal surface.

**Flexibility** The degree to which a paint film can withstand deformation without significant change in color or appearance.

**Gloss** The property of a surface related to its ability to reflect light.

**Hardness** Resistance of metal to penetration of the surface.

**Inclusions** Non-metallic materials (such as oxides, sulfides or silicates) in steel as cast.

**Inclusion Shape Control** The use of Rare Earth Metals or Calcium alloys to control the morphology of inclusions, in order to provide improved properties and formability for select applications.

**Intercoat Adhesion** The adherence which is observed between the primer and topcoat of a paint system.

**Killed Steel** Steel deoxidized by silicon or aluminum to reduce the oxygen content in the molten steel to a minimum prior to solidification of the metal.

**Leveling** Flattening of rolled sheet by reducing or eliminating distortions.

**Lüders Lines** (stretcher strain) Irregular surface markings or depressions caused by localized plastic deformation resulting from yield point elongation.

**Matte Finish** The texture produced on sheet by temper rolling with shot-blasted work rolls within a specific surface roughness range.

**Mechanical Properties** The properties of a material that reveal its elastic and plastic behavior when force is applied, for example yield strength, tensile strength, elongation, etc.

**Mil** A term used to indicate thickness of 0.001".

**Minimized Spangle** The crystal structure produced on galvanized sheet by either treating the coated sheet during solidification of the zinc or by control of coating bath chemistry.

**Oiling** Application of a suitable rust-preventive oil to flat rolled steel to retard rusting during shipment and storage. Although the oil is intended as a corrosion inhibitor only, in some instances it may also serve as a lubricant for subsequent fabricating operations.

**Pencil Hardness** A physical measurement of the hardness of a paint film which is based on the resistance of the film to cut-through by pencil leads of specified hardness. Pencil hardness values range between 2B and 5H.

**Pickling** Removing surface oxides from metals by a chemical reaction.

**Phosphatized** Chemical treatment in a phosphate solution of metallic coated sheet to prepare the surface for painting.

**Prelubricant** A lubricant applied to the sheet at the mill to enhance formability.

**Primer Coat** The base coat of paint in a typical two coat paint system.

**Product Analysis** The chemical analysis of the finished steel.

**Reflectivity (Reflectance)** A term to indicate the percentage of reflected light from a painted surface.

**Roll Forming** The fabrication process of deforming the metal sheet by passing it through a consecutive series of rolls.

**Salt Spray Test** A moisture and corrosion resistance test employing a controlled exposure of a sheet to a fog or mist of a salt solution for a specified period of time.

**Slitting** The cutting of sheet stock coils to produce narrower widths.

**T-Bend 0-, 1-, 2-, etc,** A mechanical operation wherein a sheet sample is bent back upon itself with the inside bend radius specified in terms of the sheet thicknesses. Thus a 2-T Bend is a bend with an inside radius two times the sheet thickness of the metal sheet being tested.

**Temper Rolling** A light cold reduction of the sheet steel. This operation is performed to improve flatness, eliminate fluting and stretch strain, and impart the desired surface finish.

**Tensile Strength** In tensile testing, the ratio of maximum load to original cross sectional area. Also called Ultimate Strength.

**Tension Leveling** An operation in which sheet steel in coil form is stretched beyond its yield point to provide a sheet with superior flatness characteristics.

**Tolerance** Allowed limits of deviation from a specification.

**Wash Coat** A very thin paint film applied to the back side of a prepainted sheet specified to have one finished side. The wash coat provides protection in coiling, storage, fabricating and handling.

**White Rust** The corrosion product (zinc hydroxide, etc.) that forms when galvanized sheet gets wet and is unable to dry.

**Yield Point** The load per unit of original cross-section area at which a marked increase in the deformation of the specimen occurs without increase of load.

**Yield Point Elongation** (also called Discontinuous Yielding) The non-uniform plastic flow of a metal exhibiting a yield point in which plastic deformation is inhomogeneously distributed.

**Yield Strength** The stress required to give the initial plastic (permanent) deformation, at which a material exhibits a specified deviation from proportionality of stress and strain. An offset of 0.2% is used for many metals.

# Hot Rolled Sheet

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## PRODUCT DESCRIPTION

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### Products

Our base product is a hot rolled, unpickled, mill edge, coiled product. The product is produced directly off the hot strip mill; therefore, it is not pickled, oiled, temper rolled, side trimmed nor cropped back to gauge, and is susceptible to coil breaks. The coil inside diameter is 30 inches. The product is produced to a specified nominal or minimum thickness and sold on an actual weight basis.

**Works Price Base Per 100 Pounds** Hot Rolled Sheet ..... Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel Type B, Commercial Steel Type C	None
Commercial Steel Type A	.60
Commercial Steel Type B with Boron	.30
Drawing Steel Type B	.60
Drawing Steel Type B with Boron	.90
Drawing Steel Type A (EDDS)	4.25
Specified Hardness	
(Min., Max. or 15 Point Minimum Rockwell B Range)	.60
Specified Hardness with Boron – Low Carbon	
(Min., Max. or 15 Point Minimum Rockwell B Range)	1.00
Specified Mechanical Properties	1.25
Structural Steel (ASTM A 635 conversion to ASTM A 36)	1.15
Structural Steel ASTM A 1011	
(Max. thickness .229)	
Grade 30 or 33 (a)	.25
Grade 36 (a)	1.15
Grade 40 (a)	1.20
Grade 45 (a)	1.30
Grade 50 (a)	1.35
Structural Steel ASTM A 1018	
(Thickness .230 and heavier)	
Grade 30 or 33 (a)	.25
Grade 36 (a)	1.15
Grade 40 (a)	1.20

High Strength Low Alloy Steel (ASTM A 1011 Type 1 Columbium Bearing Class 1 or 2)		
Grade 45 (a)	.....	2.20
Grade 50 (a)	.....	2.35
Grade 55 (a)	.....	2.50
High Strength Low Alloy Steel with Improved Formability ASTM A 1011		
Grade 50F (a)	.....	2.95

(a) Test reports are included in the extra.

**Size Extras**

Specified Thickness (inches)		Master Coil Width (inches)			
Nominal	Minimum	46 to under 60	60 to under 64	64 thru 70	Over 70
.259 and thicker	.250 and thicker	INQ	INQ	INQ	INQ
Under .259 thru .188	Under .250 thru .180	1.00	0	1.50	2.50
Under .188 thru .097	Under .180 thru .090	1.50	1.00	2.25	3.25
*Under .097 thru .076	*Under .090 thru .071	3.00	3.00	INQ	INQ

\*Must be ordered as Temper Rolled

**Chemistry Extras**

When ordering the following standard SAE chemistries		
1010, 1012	.....	.50
1009, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022	.....	Inquire

**SAE Chemical Composition Range**

SAE No.	Heat Chemical Composition Limits, %			
	Carbon	Manganese	Phosphorus	Sulfur
1006	0.08 max	0.45 max	0.030	0.035
1008	0.10 max	0.50 max	0.030	0.035
1009	0.15 max	0.60 max	0.030	0.035
1010	0.08-0.13	0.30-0.60	0.030	0.035
1012	0.10-0.15	0.30-0.60	0.030	0.035
1015	0.13-0.18	0.30-0.60	0.030	0.035
1016	0.13-0.18	0.60-0.90	0.030	0.035
1017	0.15-0.20	0.30-0.60	0.030	0.035
1018	0.15-0.20	0.60-0.90	0.030	0.035
1019	0.15-0.20	0.70-1.00	0.030	0.035
1020	0.18-0.23	0.30-0.60	0.030	0.035
1021	0.18-0.23	0.60-0.90	0.030	0.035
1022	0.18-0.23	0.70-1.00	0.030	0.035
1023	0.20-0.25	0.30-0.60	0.030	0.035

Although the maximum amounts of phosphorus and sulfur are 0.030 and 0.035 percent, respectively, our normal practice produces significantly lower levels for both elements.

**Specified Chemistry**

When specifications for carbon and/or manganese indicate maximums only, within the limits of carbon.

.08% thru 0.18% and/or manganese 0.45% thru 0.60% . . . None

For other association grades, chemistry range restrictions or customer specified chemistry, the following chemistry extras apply.

**Carbon and Manganese**

Maximum of Carbon Range	Maximum of Manganese Range		
	thru 0.60	0.61 thru 0.90	0.91 thru 1.15
Specified less than 0.04	.50	-	-
0.04 thru 0.25	.25	.50	.75
Carbon and Manganese other than listed above			NA

**Carbon and Manganese**

For more restricted than standard SAE (see SAE Table on page 4.2) . . . . . NA

**Aluminum**

Aluminum Killed-must be ordered in conjunction with Special Killed . . . . . .60

Specified Aluminum Content:

Aluminum .015% minimum or greater . . . . . .60

Aluminum Range . . . . . .60

\*Aluminum .035% maximum or less . . . . . .60

\*(Note: Special Killed and Aluminum extras applies)

**Nitrogen**

When specified or required . . . . . .50

**Phosphorus**

When a range is specified or required . . . . . .50

When restricted to less than 0.025% max. . . . . .50

**Sulfur**

When a range is specified or required . . . . . .40

When restricted to less than .015% to .010% . . . . . .50

When restricted to less than .010% . . . . . 1.50

Other alloy additions (including Columbium) . . . . . NA

**Specified Coil Weight**

1,000 pounds per inch of width and over . . . . . None

Under 1,000 to 800 pounds per inch of width . . . . . 1.00

Under 800 pounds per inch of width . . . . . 2.00

**Restricted Tolerances**

When thickness, width, length, or flatness tolerances are specified or required closer than standard, such tolerances will be considered on the basis of our ability to produce. Assessment of appropriate extras will be determined by analyzing the added scrap loss, labor, and machine time necessary to accomplish.

Restricted Gauge Tolerances . . . . . 1.50

Restricted Width Tolerance . . . . . Contact your AK Steel Sales Representative

**Processing Extras**

Refer to the Outside Processing section for extras not shown below.

Temper Rolled – Where flatness and freedom from coil breaks are required . . . . .	1.25
Cut Edge – Pickled only (in addition to pickled extra) . . . . .	.25
Pickled (Oiled or Dry) through Carbon .25% max. .076 nom. thru .179 nom. (.071 min. thru .171 min.) . . . .	2.00
.180 nom. thru .218 nom. (.172 min. thru .210 min.) . . . .	2.25

**General Extras**

Refer to the General Pricing Information section for inventories and item quantity.

## TOLERANCE TABLES

### Specified Thickness Tolerances

Coils and Cut Lengths, Carbon 0.25 max.

Width (inches)	Thickness (inches)					
	Over .071 to .082	Over .082 to .098	Over .098 to .180	Over .180 to .230	Over .230 to .313	Over .313 to .350
<b>Minimum Tolerances, All Plus</b>						
Over 0 to 40	.010	.012	.012	.014	.016	.018
Over 40 to 48	.010	.012	.015	.015	.018	.020
Over 48 to 60	.010	.012	.015	.015	.018	.021
Over 60 to 72	.012	.014	.016	.016	.020	.022
Over 72	.012	.014	.018	.018	.022	.024
<b>Nominal Tolerances Plus and Minus</b>						
Over 0 to 40	.005	.006	.006	.007	.008	.009
Over 40 to 48	.005	.006	.0075	.0075	.009	.010
Over 48 to 60	.005	.006	.0075	.0075	.009	.010
Over 60 to 72	.006	.007	.008	.008	.010	.011
Over 72	.006	.007	.009	.009	.011	.012

Thickness is measured at any point across the width not less than 5/8 inch from a cut edge and not less than 1 inch from a mill edge. The above table does not apply to the uncropped ends of mill edge coils.

Width (mm)	Thickness (mm)				
	Over 2.0 to 2.5	Over 2.5 to 4.5	Over 4.5 to 6.0	Over 6.0 to 8.0	Over 8.0 to 9.0
<b>Minimum Tolerances, All Plus</b>					
Over 0 to 1200	.26	.30	.34	.44	.48
Over 1200 to 1500	.26	.30	.38	.44	.52
Over 1500 to 1800	.30	.30	.42	.48	.56
Over 1800	.30	.30	.44	.54	.60
<b>Nominal Tolerances Plus and Minus</b>					
Over 0 to 1200	.13	.15	.17	.22	.24
Over 1200 to 1500	.13	.15	.19	.22	.26
Over 1500 to 1800	.15	.15	.21	.24	.28
Over 1800	.15	.15	.22	.27	.30

## Specified Width Tolerances

### Hot Rolled Cut Edge

Width (inches)	Tolerance Over, No Tolerance Under (inches)
All Gauges	
Over 0 to 12	–
Over 12 to 30	.125
Over 30 to 48	.1875
Over 48 to 60	.25
Over 60 to 80	.3125
Over 80	.375

### Hot Rolled Mill Edge

Width (inches)	Tolerance Over, No Tolerance Under (inches)
All Gauges	
Over 0 to 12	–
Over 12 to 14	.4375
Over 14 to 17	.5
Over 17 to 19	.5625
Over 19 to 21	.625
Over 21 to 24	.6875
Over 24 to 26	.8125
Over 26 to 30	.9375
Over 30 to 50	1.125
Over 50 to 78	1.5
Over 78	1.875

### Hot Rolled Cut Edge

Width (mm)	Tolerance Over, No Tolerance Under (mm)
All Gauges	
Over 0 to 300	–
Over 300 to 600	3
Over 600 to 1200	5
Over 1200 to 1500	6
Over 1500 to 1800	8
Over 1800	10

### Hot Rolled Mill Edge

Width (mm)	Tolerance Over, No Tolerance Under (mm)
All Gauges	
Over 0 to 300	–
Over 300 to 600	16
Over 600 to 1200	26
Over 1200 to 1500	32
Over 1500 to 1800	35
Over 1800	48

## Specified Flatness Tolerances

### Hot Rolled Sheet – Not Temper Rolled

Thickness (inches)		Width (inches)			
Nominal	Minimum	40 to 48	Over 48 to 60	Over 60 to 72	Over 72
.077 to .096	.071 to .089	NA	NA	NA	NA
.097 to .187	.090 to .179	1 1/2	1 1/2	2 1/4	3
.188 to .237	.180 to .229	1 1/2	NA	NA	NA

Not specified to restrictive flatness. Maximum deviation from a horizontal flat surface. Tolerances are subject to inquiry when specified minimum yield strength is 45 ksi or higher. This table is AK Steel Corporation standards and applied to lengths cut from the body of a coil. The buyer should not expect that steel which is cut from coils will meet these standards unless adequate flattening operations are performed. You should discuss coil flatness standards and how they apply to your specified end use with an AK Steel Representative. This table is the standard ASTM A 568 latest revision.

### Temper Rolled Sheet – Including Pickled Sheets

Thickness (inches)		Width (inches)			
Nominal	Minimum	to 48	Over 48 to 60	Over 60 to 72	Over 72
<b>less than 45 ksi Specified Yield Strength</b>					
.076 to .187	.071 to .180	1/2	1/2	3/4	1
.188 to .238	.181 to .230	1/2	NA	NA	NA
<b>45 to 60 ksi Specified Yield Strength</b>					
.076 to .187	.071 to .180	3/4	3/4	1 1/8	1 1/2
.188 to .238	.181 to .230	3/4	NA	NA	NA

Not specified to restrictive flatness. Maximum deviation from a horizontal flat surface. The above table applies to sheet cut to length by the customer from coils when adequate flattening operations are performed.

## Camber

Coil Widths over 12 inches maximum 1 inch in any 20 feet of length.

## MIDDLETOWN MANUFACTURING LIMITS

### Hot Rolled

Specified Thickness (inches)		Coil Width (inches) Maximum			
Nominal	Minimum	Low C	Strl Stl/ <sup>1</sup> Med C	HSLAS <sup>1</sup>	Ult Low C <sup>2</sup>
0.0799-0.0848	0.0747-0.0796	65	65	N/A	N/A
0.0849-0.0898	0.0797-0.0842	70	70	INQ	N/A
0.0899-0.2509 <sup>1</sup>	0.0843-0.2452	80	78	70	80
0.2510-0.355	0.2453-0.350	60	60	60	60

30 inch I.D. only, maximum carbon .25% only, cut length not available-must go to outside processor. If tempered rolled, the max gauge is .320 and the width max is 79 inches.

<sup>1</sup> Structural and HSLA steels are gage and width restrictive depending on the strength level ordered. The information provided above is for the least restrictive products.

<sup>2</sup> Min gauge for Ult Low C is 0.115

### Hot Rolled Pickle Mill Edge

Specified Thickness (inches)		Coil Width (inches) Maximum			
Nominal	Minimum	Low C	Strl Stl/ <sup>1</sup> Med C	HSLAS <sup>1</sup>	Ult Low C <sup>2</sup>
0.0798-0.0848	0.0745-0.0796	65	65	INQ	INQ
0.0849-0.0889	0.0797-0.0846	70	70	INQ	INQ
0.0900-0.1499 <sup>2</sup>	0.0847-0.1444	80	78	70	80
0.1500-0.1799	0.1445-0.1744	75	75	70	75
0.1800-0.2090	0.1745-0.2038	67	67	60	67

If ordered Cut Edge, the width is 1 inch less than shown in the table. If tempered rolled, the max gauge is .320 and the width max is 79 inches.

<sup>1</sup> Structural and HSLA steels are gage and width restrictive depending on the strength level ordered. The information provided above is for the least restrictive products.

<sup>2</sup> Min gauge for Ult Low C is 0.115

# Cold Rolled Sheet

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## PRODUCT DESCRIPTION

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### Products

This product is manufactured to meet a specific customer application. The product may be ordered to nominal thickness (preferred) or to minimum thickness and is sold on an actual weight basis.

### Works Price Base Per 100 Pounds

Cold Rolled Sheet . . . . . Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Special Killed . . . . .	.60
Drawing Steel Type B . . . . .	.60
Deep Drawing Steel . . . . .	1.50
Extra Deep Drawing Steel . . . . .	4.00
Extra Deep Drawing Steel Plus . . . . .	4.25
Bake Hardenable	
BH 180 . . . . .	2.05
BH 210 . . . . .	2.25
BH 250 . . . . .	2.50
Dent Resistant	
DR 180/190 . . . . .	3.75
DR 210 . . . . .	4.00
Rephos . . . . .	.90
*Specified Hardness – Applies to .026" thickness and heavier (Min., Max. or 15 Point Minimum Rockwell B Range) . . . . .	.60
1/2 Hard (70-85 RB) . . . . .	1.50
Specified Mechanical Properties . . . . .	1.25
Structural Steel	
Grade 25 (a) . . . . .	.75
Grade 30 (a) . . . . .	.75
Grade 33 (a) . . . . .	.75
Grade 40 (a) . . . . .	1.15
Full Hard (RB 84 Minimum Only) . . . . .	Deduct .75
High Strength Low Alloy Steel	
Grade 50 (a) . . . . .	4.10
Grade 40 (a) . . . . .	3.95

(a) Test reports are included in the extra.

\* Cannot test Rockwell ranges < .026"

**Chemistry Extras**

See page 13.1 of the General Product Information Section.

**Size Extras**

Thickness (inches)		Master Coil Width (inches)		
Nominal	Minimum	24 to under 46	46 to under 64	64 & over
.124 and heavier	.121 and heavier	5.50	2.00	3.25
Under .124 thru .0804	Under .121 thru .0801	4.50	1.00	2.25
Under .0804 thru .029	Under .0801 thru .028	3.50	0	1.25
Under .029 thru .025	Under .028 thru .024	4.00	4.00	3.00
Under .025 thru .021	Under .024 thru .020	6.50	6.50	5.00
Under .021	Under .020	INQ	INQ	INQ

**Finish Extras**

Matte . . . . .	None
Embossed . . . . .	1.50
Grade E (exposed) . . . . .	10.00

**Processing Extras**

Refer to the Outside Processing section for slitting and cut lengths.

**General Extras**

Refer to the General Pricing Information section for the following:  
inventory storage program, surface treatment extras, chemistry extras,  
item quantity, specified coil weight, test reporting, restricted tolerances,  
and packaging.

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**MIDDLETOWN MANUFACTURING LIMITS**

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Nominal	Minimum	Low C	Med C	HSLAS	Ult Low C
0.017-0.0183	0.0160-0.0173	50	0	0	50
0.0184-0.0227	0.0174-0.0212	60	50	50	60
0.0228-0.0251	0.0213-0.0236	64	60	50	64
0.0252-0.0302	0.0237-0.0287	76	60	50	76
0.0303-0.035	0.0288-0.0335	76	60	55	76
0.0351-0.0452	0.0336-0.0432	76	70	60	76
0.0453-0.0705	0.0433-0.0680	76	76	71	76
0.0706-0.090	0.0681-0.0875	76	66	64	76
0.0901-0.0995	0.0876-0.0970	76	66	64	76
0.0996-0.1141	0.0971-0.1111	76	66	64	76

24 inch I.D. only.

## ROCKPORT MANUFACTURING LIMITS

Specified Thickness (inches)		Coil Width (inches)				
Nominal	Minimum	Low C	Strl Stl/ Med C	HSLAS	Ult Low C	Max CSA
0.0136-0.0184	0.0126-0.0174	54.00	54.00	0.00	54.00	.94
0.0185-0.0239	0.0175-0.0224	66.00	54.00	54.00	60.00	1.34
0.024-0.0264	0.0225-0.0249	72.00	62.00	54.00	72.00	1.79
0.0265-0.0314	0.0250-0.0299	80.00	68.00	59.00	80.00	2.39
0.0315-0.0364	0.0300-0.0349	80.00	75.00	66.00	80.00	2.79
0.0365-0.0419	0.0350-0.0399	80.00	75.00	69.00	80.00	3.19
0.042-0.0469	0.0400-0.0449	80.00	78.00	69.00	80.00	3.59
0.047-0.0724	0.0450-0.0699	80.00	78.00	69.00	80.00	5.59
0.0725-0.0825	0.0700-0.0800	72.00	72.00	64.00	72.00	5.76
0.0825-0.138	0.0800-0.135	72.00	62.00	64.00	72.00	11.30

Cross Sectional Area (8' SA)

24 inch I.D. only.

Inquire on gauges below 0.018" and over 0.120".

HSLA - inquire on gauges below 0.024" and over 0.120".

# Enameling Steel

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## PRODUCT DESCRIPTION

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### Products

UNIVIT<sup>®</sup>, ASTM A 424 Type 1, is melted to a specific chemistry and is specially processed to allow direct-on cover coat porcelain enameling without fear of carbon boiling or fishscaling.

VIT-PLUS<sup>™</sup>, ASTM A 424 Type 2, is a controlled chemistry, nondecarburized, aluminum killed, enameling steel. It is suited for ground coat, ground coat + cover coat, and two coat-one fire enameling systems (wet or dry; pickle or pickle free).

I-F<sup>®</sup> Enameling Steel, ASTM A 424 Type 3, is a special enameling product that offers superior drawability and sag resistance, and because it is interstitial-free, it is non-aging and nonfluting. This product is suitable for ground coat porcelain enamel only.

UNIVIT, I-F Enameling Steel, and VIT-PLUS products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to minimum thickness.

These products are described in ASTM A 424.

### Works Price Base Per 100 Pounds

UNIVIT . . . . . Inquire  
 VIT-PLUS . . . . . Inquire  
 I-F Enameling Steel . . . . . Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel . . . . . None  
 Drawing Steel . . . . . .60

### Size Extras

Thickness (inches)		Master Coil Width (inches)		
Nominal	Minimum	24 to under 46	46 to under 64	64 & over
.0635 and heavier	.061 and heavier	3.50	0	1.25
Under .0635 thru .029	Under .061 thru .028	3.50	0	1.25
Under .029 thru .025	Under .028 thru .024	4.00	4.00	3.00
Under .025 thru .021	Under .024 thru .020	6.50	6.50	5.00
Under .021	Under .020	INQ	INQ	INQ

**Surface Treatment Extras**

UNIVIT and I-F Enameling Steel are furnished "Dry" or "Oiled" as specified by the customer.

Porcelain enameling grades are normally furnished with a slightly roughened surface which helps hold the slip while it dries for firing.

**General Extras**

Refer to the General Pricing Information section for the following: inventory storage program, item quantity, specified coil weight, test reporting, restricted tolerances, and packaging.

**Test Reports**

Test reports for UNIVIT contain ladle chemistry.

**MIDDLETOWN AND ROCKPORT MANUFACTURING LIMITS**

UNIVIT, I-F Enameling Steel, VIT-PLUS

Specified Thickness (Inches)		Coil Width (Inches)			
Nominal	Minimum	Low C	Strl Str/ Med C	HSLAS	Ult Low C
0.018-0.0221	0.0170-0.0213	62	N/A	N/A	60
0.0222-0.0246	0.0214-0.0238	72	N/A	N/A	72
0.0247-0.0694	0.0239-0.0681	80	N/A	N/A	80
0.0695-0.0843	0.0682-0.0829	78	N/A	N/A	72

24 inch I.D. only, UNIVIT has potential for coil breaks in gauges of .060 and greater.

# Aluminized Steel Type 1

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## PRODUCT DESCRIPTION

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### Products

Aluminized Steel Type 1 is a carbon sheet product coated with an aluminum-silicon alloy coating. It is produced by a continuous hot dip process. The aluminum-silicon alloy coating resists the destructive effects of exposure to combinations of heat and corrosion. Aluminized Steel Type 1 is ideal for applications involving temperatures up to 1250°F and for moderately severe forming. This product, described in ASTM A 463, is available in four coating weights T1 13, T1 25, T1 40, and T1 60. The approximate coating composition is 8% to 10% silicon, the balance aluminum. Aluminized Steel Type 1 has the surface characteristics of aluminum with the superior strength and lower cost of steel. It has a satiny, matte finish but is also available with an extra smooth (temper-rolled) finish where additional reflectivity or surface uniformity is desired. Aluminized Steel Type 1 sheet products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to a minimum thickness. T125 or lighter is recommended to minimize flaking during difficult drawing or forming operations.

Drawing Quality High Temperature (DQHT) is an Aluminized Type 1 steel that exhibits superior resistance to the formation of brittle, dark-colored surface alloying at temperatures approaching 1050°F. Conventional aluminum coated steel alloys at about 850°F. This grade has formability characteristics approaching DDS and is subject to strain aging.

ALUMI-THERM is an aluminized low alloy steel that has excellent mechanical properties at elevated temperatures. It is considerably stronger than low carbon aluminized at temperatures above 900°F. It can be used in severe cyclic service up to 1400°F and can perform well at higher temperatures in some applications.

**Works Price Base Per 100 Pounds** Aluminized Steel Type 1 . . . . . Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Deep Drawing Steel . . . . .	2.25
Extra Deep Drawing Steel . . . . .	4.00
Extra Deep Drawing Steel Plus . . . . .	4.25
Drawing Quality High Temperature (DQHT) . . . . .	5.10
ALUMI-THERM . . . . .	10.30
Heat Treat with Boron . . . . .	Inquire
*Specified Hardness – Applies to .026" thickness and heavier (Min., Max., or 15 Point Minimum Rockwell B Range) . . . .	.60
Specified Mechanical Properties . . . . .	1.25

\* Cannot test Rockwell ranges < .026"

Structural Steel (ASTM A 463)	
Grade 33 (a)	.75
Grade 37 (a)	.85
Grade 40 (a)	1.15
High Strength Low Alloy Steel	
Grade 45 (a)	4.05
Grade 50 (a) (ASTM A 463)	4.10
(a) Test reports are included in the extra.	

### Size Extras

Thickness and width extras for Aluminized Steel Type 1 are to be taken from the table below. After the thickness/width extra is established, the extras for the coating category ordered are to be added.

Thickness (inches)		Master Coil Width (inches)		
Nominal	Minimum	24 to under 30	30 to under 45	45 to 60
.0625 and heavier	.060 and heavier	3.00	2.50	0
Under .062 thru .029	Under .060 thru .028	3.50	2.50	0
Under .029 thru .023	Under .028 thru .022	4.00	3.00	2.50
Under .023 thru .020	Under .022 thru .019	6.50	5.50	5.00
Under .020 thru .018	Under .019 thru .017	8.00	7.00	6.50

### Coating Extras

Coating categories other than those shown are subject to inquiry. Extras shown include the total coating on both sides.

Thickness (inches)		Coating Extras					
Oz./Sq. Ft. Min. TST Total Both Sides		T1 13	T1 25	T1 26	T1 40	T1 50	T1 60
		.13 (a)	.25 (a)	.26 (a)	.40 (a)	.50 (a)	.60 (a)
Nominal	Minimum						
.134 and Heavier	.130 and Heavier	1.05	1.45	1.50	1.90	2.15	2.35
Under .134 thru .120	Under .130 thru .116	1.05	1.50	1.55	1.90	2.15	2.35
Under .120 thru .105	Under .116 thru .101	1.05	1.50	1.55	1.95	2.50	2.40
Under .105 thru .087	Under .101 thru .085	1.15	1.60	1.65	2.05	2.30	2.50
Under .087 thru .077	Under .085 thru .075	1.45	2.05	2.10	2.70	3.05	3.40
Under .077 thru .062	Under .075 thru .060	1.50	2.10	2.15	2.80	3.15	3.45
Under .062 thru .054	Under .060 thru .052	1.60	2.20	2.25	2.95	3.35	3.70
Under .054 thru .046	Under .052 thru .044	1.90	2.65	2.75	3.60	4.10	4.60
Under .046 thru .037	Under .044 thru .036	2.40	3.30	3.40	4.50	5.10	5.70
Under .037 thru .033	Under .036 thru .032	2.70	3.75	3.85	5.10	5.80	6.45
Under .033 thru .029	Under .032 thru .028	3.10	4.30	4.40	5.85	6.65	7.45
Under .029 thru .026	Under .028 thru .025	3.55	4.90	5.05	6.55	7.40	8.20
Under .026 thru .023	Under .025 thru .022	4.00	5.55	5.70	7.45	INQ	INQ
Under .023 thru .021	Under .022 thru .020	4.45	6.15	6.30	8.35	INQ	INQ
Under .021 thru .020	Under .020 thru .019	4.90	6.75	6.90	9.15	INQ	INQ
Under .020 thru .019	Under .019 thru .018	4.95	6.85	7.05	9.30	INQ	INQ
Under .019 thru .018	Under .018 thru .017	5.50	7.60	7.80	10.45	INQ	INQ

(a) No maximum limit.

**Finish Extra**

EXTRASMOOTH ..... 1.50  
 Inquire on orders when finish is EXTRASMOOTH and the surface treatment is dry.

**Surface Treatment Extras**

Our standard practice includes the application of an oil and/or chemical treatment on Aluminized Steel Type 1 Sheet for protection from storage stain.

## Standard Chemical Treatment

CS, EDDS, and EDDS + ..... None  
 DQHT and DDS ..... N/A  
 EXTRASMOOTH/Temper Rolled ..... N/A

**Processing Extras**

Refer to the Outside Processing section for dimensions not listed.

**General Extras**

Refer to the General Pricing Information section for the following: inventory storage program, finish extras, chemistry extras, item quantity, specified coil weight, test reporting, restricted tolerances, and packaging.

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**MIDDLETOWN MANUFACTURING LIMITS**


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Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge	Min. Gauge	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0170-0.0189	0.0150-0.0169	52	0	0	0
0.0190-0.0199	0.0170-0.0179	54	54	54	40
0.0200-0.0210	0.0180-0.0190	54	54	54	52
0.0211-0.0220	0.0191-0.0200	56	56	56	52
0.0221-0.0250	0.0201-0.0230	56	56	56	54
0.0251-0.0280	0.0231-0.0260	60	60	60	60
0.0281-0.0860	0.0261-0.0800	60	60	60	60
0.0861-0.0950	0.0801-0.0890	60	60	60	60
0.0951-0.1110	0.0891-0.1050	56.25	0	0	56.25
0.1111-0.1460	0.1051-0.1400	56.25	0	0	56.25

Cross Sectional Area (CSA) Limit: Max width = 5.70/gauge  
 24 inch I.D. only, maximum thickness to temper roll is .115 minimum or .119 nominal.

# Aluminized Steel Type 2

## PRODUCT DESCRIPTION

### Products

Aluminized Steel Type 2 is a carbon sheet steel with a coating of commercially pure aluminum. It is produced by the continuous hot dip process. The coating process creates a metallurgical bond between the coating and the steel base, and provides a uniform coating thickness of aluminum having a silvery, matte finish. Aluminized Steel Type 2 has the surface characteristics of aluminum and superior strength and lower cost of steel.

Aluminized Steel Type 2 is used for products such as building roof panels and corrugated culverts.

Aluminized Steel Type 2, described in ASTM Standard A 463, is available in T2 65 and T2 100 coating weights.

**Works Price Base Per 100 Pounds** Aluminized Steel Type 2 . . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Specified Hardness – Applies to .026" thickness and heavier (Min., Max. or 15 Point Minimum Rockwell B Range) . . . . .	.60
*Specified Mechanical Properties . . . . .	1.25
Structural Steel ASTM A 463	
Grade 33, 37 (a) . . . . .	INQ
Grade 40 (a) . . . . .	INQ
High Strength Low Alloy Steel	
Grade 45 (a) . . . . .	INQ
Grade 50 ASTM A 463 (a) . . . . .	INQ

(a) Test reports are included in the extra.

\* Cannot test Rockwell ranges < .026"

## Size Extras

Thickness and width extras for Aluminized Steel Type 2 are to be taken from the table below. After the thickness and width extras are established, the extras for the coating category ordered are to be added.

Thickness (inches)		Master Coil Width (inches)		
Nominal	Minimum	24 to under 30	30 to under 45	45 to 60
.0625 & heavier	.060 & heavier	3.00	2.50	0
Under .062 thru .029	Under .060 thru .028	3.50	2.50	0
Under .029 thru .023	Under .028 thru .022	4.00	3.00	2.50
Under .023 thru .020	Under .022 thru .019	6.50	5.50	5.00
Under .020 thru .018	Under .019 thru .017	8.00	7.00	6.50

## Coating Extras

Extras for the coating weights listed apply to Type 2 hot dip commercially pure aluminum coating.

Thickness (inches)		Coating Extras	
Oz./Sq. Ft. Min. TST Total Both Sides		T2 65 .65 (a)	T2 100 1.00 (a)
Nominal	Minimum		
.134 & Heavier	.130 & Heavier	1.05	2.05
Under .134 thru .120	Under .130 thru .116	1.65	2.55
Under .120 thru .105	Under .116 thru .101	1.90	3.25
Under .105 thru .087	Under .101 thru .085	2.20	3.90
Under .087 thru .077	Under .085 thru .075	2.80	4.80
Under .077 thru .062	Under .075 thru .060	3.30	5.05
Under .062 thru .054	Under .060 thru .052	4.20	6.30
Under .054 thru .046	Under .052 thru .044	4.65	8.40
Under .046 thru .037	Under .044 thru .036	5.85	10.60
Under .037 thru .033	Under .036 thru .032	6.85	12.30
Under .033 thru .029	Under .032 thru .028	INQ	INQ
Under .029 thru .026	Under .028 thru .025	INQ	INQ
Under .026 thru .023	Under .025 thru .022	INQ	INQ
Under .023 thru .021	Under .022 thru .020	INQ	INQ
Under .021 thru .020	Under .020 thru .019	INQ	INQ
Under .020 thru .019	Under .019 thru .018	INQ	INQ
Under .019 thru .018	Under .018 thru .017	INQ	INQ

Thickness ordering ranges are for pricing purposes only and are not to be used as tolerances.

(a) No maximum limits.

**Surface Treatment Extras**

Our standard practice includes the application of an oil and/or chemical treatment on Aluminized Steel Type 2 Sheet for protection from storage stain.

**Processing**

Refer to the Outside Processing section for dimensions not listed.

**General Extras**

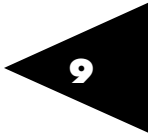
Refer to the General Pricing section for the following: inventory storage program, finish extras, surface treatment extras, specified coil weight, test reporting, restricted tolerances, and packaging.

**MIDDLETOWN MANUFACTURING LIMITS**

Specified Thickness (inches)				Coil Width (inches)			
Nom. Gauge		Min. Gauge		Strl Stl/			
Min.	Max.	Min.	Max.	Low C	Med C	HSLAS	Ult Low C
0.0170-0.0189		0.0150-0.0169		52	0	0	0
0.0190-0.0199		0.0170-0.0179		54	54	54	40
0.0200-0.0210		0.0180-0.0190		54	54	54	52
0.0211-0.0220		0.0191-0.0200		56	56	56	52
0.0221-0.0250		0.0201-0.0230		56	56	56	54
0.0251-0.0280		0.0231-0.0260		60	60	60	60
0.0281-0.0860		0.0261-0.0800		60	60	60	60
0.0861-0.0950		0.0801-0.0890		60	60	60	60
0.0951-0.1110		0.0891-0.1050		56.25	0	0	56.25
0.1111-0.1460		0.1051-0.1400		56.25	0	0	56.25

Cross Sectional Area (CSA) Limit: Max width = 5.70/gauge  
 24 inch I.D. only, maximum thicknesses to temper roll is .115 minimum or .119 nominal.

# ZINCGRIP Steel




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## PRODUCT DESCRIPTION

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### Products

ZINCGRIP® Steel is a carbon steel sheet product with a zinc coating applied by passing the steel through a bath of molten zinc by a continuous hot dip process. Minimized Spangle is ZINCGRIP that through control of the coating bath chemistry has no visible spangle. It is available in the full range of coating weights and base metal qualities. It is used in noncritical surface applications and is not guaranteed to be free from stretcher stain, luder lines, or fluting. Extra Smooth is product that is produced by skin passing the coated sheet with a small amount of reduction in thickness to smooth the surface and impart resistance to stretcher strain and fluting. It is especially suited for applications where appearance is important either as painted or unpainted. ZINCGRIP ULTRASMMOOTH is a product that has been produced by a process that supplies a product with surface appearance, uniformity, freedom from surface defects, and consistency of quality that is superior to Extra Smooth. Applications would be the more stringent surface quality requirements. These coatings provide galvanic, as well as barrier protection. The product is available in a variety of coating weights and surface finishes and is described in ASTM A 653.

ZINCGRIP Steel products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to minimum thickness.

### Works Price Base

**Per 100 Pounds** ZINCGRIP Galvanized ..... Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel Type A, Type B and Type C .....	None
Forming Steel	
Type A .....	1.50
Type B .....	.60
Deep Drawing Steel .....	2.25
Extra Deep Drawing Steel .....	4.00
Extra Deep Drawing Steel Plus .....	4.25
Bake Hardenable	
BH 180 .....	2.05
BH 210 .....	2.25
BH 250 .....	2.50
Dent Resistant	
DR 180/190 .....	3.75
DR 210 .....	4.00
Dual Phase 590/600 .....	INQ
Structural Steel	
Grade 33 (a) .....	.75
Grade 37 (a) .....	.85
Grade 40 (a) .....	1.15
Grade 50 class 1 (a) .....	1.35
Grade 50 class 2 (a) .....	1.20
High Strength Low Alloy Steel	
Grade 50 (a) .....	4.10**
Grade 45 (a) .....	4.05**
Grade 40 (a) .....	3.95**

(a) Test reports are included in the extra.

\* Cannot test Rockwell ranges < .026" \*\*Includes extra for killed steel

## Size Extras

Thickness (inches)		Master Coil Width (inches)			
Nominal	Minimum	24 to under 46	46 to under 64	64 to 72	over 72
.124 & Heavier	.121 & Heavier	5.50	2.00	3.25	4.25
Under .124 thru .0804	Under .121 thru .0801	4.50	1.00	3.25	4.25
Under .0804 thru .029	Under .0801 thru .028	3.50	0	1.25	2.25
Under .029 thru .025	Under .028 thru .024	4.00	4.00	3.00	4.00
Under .025 thru .021	Under .024 thru .020	6.50	6.50	5.00	INQ
Under .021	Under .020	INQ	INQ	INQ	INQ

## Coating Extras

Product included in these categories is typically ordered in grams/square meter and the coating weight is typically specified on a per-side basis. For example, a 60G/60G coating category requires a minimum of 60 grams/square meter SST on each surface. Although the coating weight is specified on a per-side basis, our standard product is coated on both surfaces. The first number in the coating weight designates the unexposed side. The second number in the coating weight designates the exposed side. Standard practice unless requested is to supply coils prime side out.

Extras for coating categories apply to hot dipped zinc type coatings.  
**Extras shown include the total coating on both sides.**

Use this table for galvanized products when coatings are designated as g/sq.m. Coating weights other than those specified are subject to inquiry for availability. However, the extra for the next higher category will apply.

### Specified to other than ASTM A 653 Coating Designation

Thickness (inches)		Coating Extras							
G/Sq. M MIN SST per side		20G/ 20G	40G/ 40G	50G/ 50G	60G/ 60G	70G/ 70G	90G/ 90G	98G/ 98G	
Nominal	Minimum								
.134 & Heavier	.130 & Heavier	2.20	2.20	2.20	2.25	2.50	2.80	2.90	
Under .134 thru .087	Under .130 thru .085	2.35	2.35	2.35	2.70	2.90	3.25	3.30	
Under .087 thru .062	Under .085 thru .060	2.90	2.90	2.90	3.10	3.55	4.05	4.15	
Under .062 thru .046	Under .060 thru .044	3.40	3.40	3.40	3.70	4.25	5.00	5.15	
Under .046 thru .037	Under .044 thru .036	3.85	3.85	3.85	4.35	5.00	5.75	6.20	
Under .037 thru .033	Under .036 thru .032	4.25	4.25	4.25	4.85	5.60	6.50	6.95	
Under .033 thru .029	Under .032 thru .028	4.75	4.75	4.75	5.35	6.05	7.25	7.65	
Under .029 thru .026	Under .028 thru .025	5.05	5.05	5.05	5.75	6.75	7.95	8.40	
Under .026 thru .023	Under .025 thru .022	5.60	5.60	5.60	6.35	7.35	8.90	9.40	
Under .023 thru .021	Under .022 thru .020	6.05	6.05	6.05	6.95	8.10	9.60	10.20	
Under .021 thru .019	Under .020 thru .018	NA	NA	NA	NA	NA	10.50	11.20	
Under .019 thru .018	Under .--018 thru .017	NA	NA	NA	NA	NA	11.50	12.40	

Revised Effective 10/15/10

Restricted coating weight distribution extra is included in this Table.

Extras for the coating weights listed apply to hot dipped, two-side coatings. Coating categories other than those specified, including differential coatings, are subject to inquiry. **Extras shown include the total coating on both sides.**

**Specified to ASTM A 653 Coating Designation only**

Thickness (inches)		Coating Extras					
Oz./Sq. Ft. Min.		G01	G30	G40	G60	G90	
MIN TST total both sides		No Min.	.30	.40	.60	.90	
Nominal	Minimum						
.134 & Heavier	.130 & Heavier	.85	.85	.85	1.15	1.65	
Under .134 thru .087	Under .130 thru .085	1.35	1.35	1.35	1.90	2.70	
Under .087 thru .062	Under .085 thru .060	1.65	1.65	1.65	2.60	3.65	
Under .062 thru .046	Under .060 thru .044	2.35	2.35	2.35	3.40	5.00	
Under .046 thru .037	Under .044 thru .036	2.90	2.90	2.90	4.25	6.20	
Under .037 thru .033	Under .036 thru .032	3.25	3.25	3.25	4.75	6.80	
Under .033 thru .029	Under .032 thru .028	3.70	3.70	3.70	5.45	7.85	
Under .029 thru .026	Under .028 thru .025	4.25	4.25	4.25	6.05	8.80	
Under .026 thru .023	Under .025 thru .022	4.75	4.75	4.75	6.80	9.90	
Under .023 thru .021	Under .022 thru .020	5.30	5.30	5.30	7.55	10.95	
Under .021 thru .019	Under .020 thru .018	NA	5.75	5.75	8.40	12.20	
Under .019 thru .018	Under .018 thru .017	NA	6.75	6.75	9.40	13.75	
		<b>G115</b>	<b>G140</b>	<b>G165</b>	<b>G185</b>	<b>G210</b>	<b>G235</b>
		<b>1.15</b>	<b>1.40</b>	<b>1.65</b>	<b>1.85</b>	<b>2.10</b>	<b>2.35</b>
.134 & Heavier	.130 & Heavier	2.20	3.05	3.55	4.05	4.50	4.95
Under .134 thru .087	Under .130 thru .085	3.30	4.60	5.45	6.25	6.90	7.75
Under .087 thru .062	Under .085 thru .060	4.65	6.50	7.75	8.65	9.65	10.85
Under .062 thru .046	Under .060 thru .044	6.35	8.90	10.45	11.85	13.20	14.90
Under .046 thru .037	Under .044 thru .036	7.80	10.85	12.80	13.85	16.20	NA
Under .037 thru .033	Under .036 thru .032	8.70	12.15	15.15	16.30	18.20	NA
Under .033 thru .029	Under .032 thru .028	10.05	14.00	16.75	18.70	NA	NA
Under .029 thru .026	Under .028 thru .025	11.20	15.55	NA	NA	NA	NA
Under .026 thru .023	Under .025 thru .022	12.70	16.90	NA	NA	NA	NA
Under .023 thru .021	Under .022 thru .020	14.00	19.50	NA	NA	NA	NA
Under .021 thru .019	Under .020 thru .018	NA	NA	NA	NA	NA	NA
Under .019 thru .018	Under .018 thru .017	NA	NA	NA	NA	NA	NA

Specific Coating Weight Distribution  
(UL Requirement) ..... .50

For orders specified to ASTM A 653 Coating Category, the minimum triple-spot average coating weight on any one side shall not be less than 40% of the single-spot requirement. When the coating weight is required to meet a specified minimum on a per-side basis including differential coating weight requirements, the above extra is applicable. (This includes Underwriters Laboratory requirements.)

**Finish Extras**

ULTRASMOOTH .....	6.00
EXTRASMOOTH .....	1.50
Minimum Spangle .....	None

Inquire on orders when finish is EXTRASMOOTH or ULTRASMOOTH and the surface treatment is dry.

The product must be ordered ULTRASMOOTH or EXTRASMOOTH to prevent strain or fluting in subsequent operations. In CS material, the effect of Temper Rolling is temporary due to the phenomenon commonly known as aging. EXTRASMOOTH is recommended for coil coated applications.

**Surface Treatment Extras**

We recommend the application of an oil or chemical treatment to help protect against storage stain. Material that is to be subsequently painted should not be ordered "Chem Treated" unless suitable paint pretreatments are employed.

Chem Treated .....	None
Chem Treated (RoHs Compliant) .....	Inquire
PAINTGRIP .....	3.00

EXTRASMOOTH and ULTRASMOOTH, with Chemtreat, Paintgrip, or Prelube cannot be ordered at thicknesses greater than 0.80".

Coating Line Capabilities	Coating Line Capabilities		
	Ashland	Middletown	Rockport
Chem Treated	Yes	Yes	Yes
Chem Treat - (EXTRASMOOTH, ULTRASMOOTH, DDS)	No	No	Yes
PAINTGRIP - MS	Yes	Yes	No
PAINTGRIP - (EXTRASMOOTH, ULTRASMOOTH, DDS)	No	No	No

Cross Sectional Area (CSA) Limit: Max width = 5.70/gauge  
24 inch I.D. only, maximum thickness to temper roll is .125 minimum or .129 nominal.

**General Extras**

Refer to the General Pricing Section for the following: inventory and storage program, chemistry extras (including specified chemistry), item quantity, specific coil weight, test reporting, restricted tolerances, and packaging.

## MIDDLETOWN MANUFACTURING LIMITS

### MW ZINCGRIP Minimized Spangle Non Temper Rolled

Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge Min.	Min. Gauge Max.	Low C	Strl St/ Med C	HSLAS	Ult Low C
0.0219-0.0235	0.0211-0.0226	72	50	0	72
0.0236-0.0260	0.0227-0.0251	72	60	50	72
0.0261-0.0310	0.0252-0.0299	72	60	50	72
0.0311-0.0359	0.0300-0.0348	74	70	55	74
0.0360-0.0461	0.0349-0.0448	74	70	60	74
0.0462-0.0710	0.0449-0.0695	74	70	64	74
0.0711-0.0891	0.0696-0.0869	74	66	66	74
0.0892-0.0910	0.0870-0.0881	72	66	66	72
0.0911-0.0977	0.0882-0.0948	72	66	64	72
0.0978-0.1012	0.0949-0.0983	72	66	64	72
0.1013-0.1212	0.0984-0.1183	66	60	60	66
0.1213-0.1304	0.1184-0.1275	62	60	60	62
0.1305-0.1338	0.1276-0.1316	62	60	0	62

PAINTGRIP minimum gauge is  $\geq .030$ "

### MW ZINCGRIP ULTRASMOOTH & EXTRASMOOTH

Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge Min.	Min. Gauge Max.	Low C	Strl St/ Med C	HSLAS	Ult Low
0.0221-0.0235	0.0212-0.0226	72	50	0	72
0.0236-0.0258	0.0227-0.0248	72	60	50	72
0.0259-0.0306	0.0249-0.0296	72	60	50	72
0.0307-0.0353	0.0297-0.0342	73	70	55	73
0.0354-0.0455	0.0343-0.0442	73	70	60	73
0.0456-0.0705	0.0443-0.0692	73	70	64	73
0.0706-0.0879	0.0693-0.0859	73	66	66	73
0.0880-0.0909	0.0860-0.0883	72	66	66	72
0.0910-0.0981	0.0884-0.0955	72	66	64	72
0.0982-0.0991	0.0956-0.0967	72	66	64	72
0.0992-0.1192	0.0968-0.1167	66	60	60	66
0.1193-0.1243	0.1168-0.1218	62	60	60	62

## ASHLAND MANUFACTURING LIMITS

### Ashland ZINCGRIP

Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge Min.	Min. Gauge Max.	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0200-0.0229	0.0190-0.0224	54	50	50	50
0.0230-0.0244	0.0225-0.0235	54	60	60	60
0.0245-0.0303	0.0236-0.0293	63	60	60	63
0.0304-0.0403	0.0294-0.0393	63	54	60	63
0.0404-0.0503	0.0394-0.0490	63	50	60	63
0.0504-0.0603	0.0491-0.0588	63	48	60	63
0.0604-0.0669	0.0589-0.0653	63	42	60	63
0.0670-0.0672	0.0654-0.0686	CSA (max. 63)	CSA (max. 60)	CSA (max. 60)	CSA (max. 63)
0.0673-0.0748	0.0687-0.0730	CSA (max. 63)	CSA (max. 60)	CSA (max. 60)	CSA (max. 63)
0.0749-0.0770	0.0731-0.0742	CSA (max. 60)	CSA (max. 60)	CSA (max. 60)	CSA (max. 63)

Cross Sectional Area (CSA) Limit: Max width = 4.20/gauge

If ordered Cut Edge, the width is 1 inch less than shown in the table.

24 inch I.D. only, minimum coil width – 20 inches.

Inquire for availability for orders below 0.0190 gauge.

Inquire for availability for orders above width limits (<63") on Med C and HSLA class material.

PAINTGRIP minimum gauge is  $\geq .019"$

## ROCKPORT MANUFACTURING LIMITS

### Rockport ZINCGRIP

Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge	Min. Gauge	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0190-0.0215	0.018-0.020	54	N/A	N/A	49
0.0216-0.0244	0.0201-0.0224	60	N/A	N/A	54
0.0245-0.0269	0.0225-0.0249	68	N/A	N/A	61
0.027-0.0319	0.025-0.0299	75	60	60	68
0.032-0.0419	0.030-0.0399	80	70	70	80
0.042-0.0724	0.040-0.0699	80	76	76	80
0.073-0.082	0.070-0.078	76	76	76	80

Inquire for availability on Bakeherd orders.

Inquire for availability on orders 77" – 80" wide.

Inquire for availability on orders 40" – 45" wide.

# Galvanized Culvert Sheets

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## PRODUCT DESCRIPTION

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### Products

Galvanized Culvert Sheet products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to minimum thickness.

### Works Price Base Per 100 Pounds

Galvanized Sheet Flat Culvert . . . . . Inquire

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## EXTRAS PER 100 POUNDS

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Width and thickness extras for AK Steel Galvanized Culvert Sheet products are to be taken from the table of Width/Thickness Extra shown below. After the width thickness extra is established, the extras for the galvanized coating from the next table are to be added.

### Size Extras

Thickness (inches)		Width (inches)	
Nominal	Minimum	24 to under 46	46 to 60
.064 & .100	.061 & .100	3.50	0
Under .064 thru .046	Under .061 thru .044	3.50	0

### Coating Extras

The following table of extras includes the extra for 2.00 ounces per square foot coating by the triple spot test in accordance with American Association of State Highway Transportation Officials Specification (AASHTO). Extras shown include total coating both sides.

#### Specified to AASHTO Coating Designation

Thickness (inches)		Coating Extras
Nominal	Minimum	Ordered Coating Category Ounces Per Square Foot 2.00
.109	.101	5.50
.079	.072	7.70
.064	.057	9.70
.052	.046	13.25

Revised Effective 10/15/10

## Specifications

AASHTO General Requirement:

Weight of Coating – 2.00 oz./sq. ft. Total Both Sides (Triple Spot Test)

Mechanical Requirements (minimum)

Tensile Strength – 45 ksi

Yield Strength – 33 ksi

Elongation – 20%

Steel Chemical Composition (1)

Sulphur, max. . . . . 0.05%

Sum of Carbon, Manganese, Phosphorus, Silicon, and

Sulphur, max. . . . . 0.70%

(1) The requirement for copper has been deleted from AASHTO Specification.

## Tolerances

The dimensional tolerances for AK Steel Galvanized Culvert Sheet are the same as for ZINCGRIP Galvanized Sheet.

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## MIDDLETOWN MANUFACTURING LIMITS

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Standard Thickness (inches)		Maximum Width (inches)
Nominal	Minimum	
0.109	0.101	60
0.079	0.072	60
0.064	0.057	60
0.052	0.046	60

\*Inquire for availability >60" wide and any quality ordered other than CSP, or CS Type B.

# ZINCGRIP Galvannealed Steel

## PRODUCT DESCRIPTION

**Products** ZINCGRIP® Galvannealed Steel is a carbon steel sheet product with a zinc coating applied by passing the steel through a bath of molten zinc by a continuous hot dip process. The steel is then further processed in-line to fully alloy the coating. Zinc-Iron alloy coating is not spangled, is normally dull gray in appearance, and is suitable for immediate painting without further treatment except for normal cleaning. Minimized Spangle is ZINCGRIP GA that through control of the coating bath chemistry has no visible spangle. It is available in the full range of coating weights and base metal qualities. It is used in noncritical surface applications and is not guaranteed to be free from stretcher stain, luder lines, or fluting. ZINCGRIP GA Extra Smooth is product that is produced by skin passing the coated sheet with a small amount of reduction in thickness to smooth the surface and impart resistance to stretcher strain and fluting. It is especially suited for applications where appearance is important either as painted or unpainted. ZINCGRIP GA ULTRASMMOOTH is a product that has been produced by a process that supplies a product with surface appearance, uniformity, freedom from surface defects, and consistency of quality that is superior to EXTRASMMOOTH. Applications would be the more stringent surface quality requirements. The coating provides galvanic, as well as barrier protection. The product is available in a variety of coating weights and surface finishes and is described in ASTM A 653.

ZINCGRIP Galvannealed Steel products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to minimum thickness.

**Works Price Base Per 100 Pounds** ZINCGRIP Galvannealed ..... Inquire

## EXTRAS PER 100 POUNDS

<b>Quality Extras</b>	Commercial Steel Type A, Type B and Type C .....	None
	Forming Steel	
	Type A .....	1.50
	Type B .....	.60
	Deep Drawing Steel .....	2.25
	Extra Deep Drawing Steel .....	4.00
	Extra Deep Drawing Steel Plus .....	4.25
	Bake Hardenable	
	BH 180 .....	2.05
	BH 210 .....	2.25
	BH 250 .....	2.50
	Dent Resistant	
	DR 180/190 .....	3.75
	DR 210 .....	4.00
	Dual Phase 590/600 .....	INQ
	Structural Steel	
	Grade 33 (a) .....	.75
	Grade 37 (a) .....	.85
	Grade 40 (a) .....	1.15
	Grade 50 class 1 (a) .....	1.35
	Grade 50 class 2 (a) .....	1.20
	High Strength Low Alloy Steel	
	Grade 50 (a) .....	4.10**
	Grade 45 (a) .....	4.05**
	Grade 40 (a) .....	3.95**

(a) Test reports are included in the extra.  
\* Cannot test Rockwell ranges < .026" \*\*Includes extra for killed steel

## Size Extras

Thickness (inches)		Master Coil Width (inches)			
Nominal	Minimum	24 to under 46	46 to under 64	64 to 72	Over 72
.124 & Heavier	.121 & Heavier	5.50	2.00	3.25	4.25
Under .124 thru .0804	Under .121 thru .0801	4.50	1.00	3.25	4.25
Under .0804 thru .029	Under .0801 thru .028	3.50	0	1.25	2.25
Under .029 thru .025	Under .028 thru .024	4.00	4.00	3.00	4.00
Under .025 thru .021	Under .024 thru .020	6.50	6.50	5.00	INQ
Under .021	Under .020	INQ	INQ	INQ	INQ

## Coating Extras

Product included in these categories is typically ordered in grams/square meter and the coating weight is typically specified on a per-side basis. For example, a 60A/60A coating category requires a minimum of 60 grams/square meter SST on each surface. Although the coating weight is specified on a per-side basis, our standard product is coated on both surfaces. The first number in the coating weight designates the unexposed side. The second number in the coating weight designates the exposed side. Standard practice unless requested is to supply coils prime side out.

Extras for coating categories apply to hot dipped zinc type coatings. **Extras shown include the total coating on both sides.**

Use this table for galvanized products when coatings are designated as g/sq.m. Coating weights other than those specified are subject to inquiry for availability. However, the extra for the next higher category will apply.

### Specified to other than ASTM A 653 Coating Designation

Thickness (inches)		Coating Extras			
G/Sq. M MIN SST per side		20A/ 20A	40A/ 40A	45A/ 45A	60A/ 60A
Nominal	Minimum				
.134 & Heavier	.130 & Heavier	2.20	2.20	2.20	2.25
Under .134 thru .087	Under .130 thru .085	2.35	2.35	2.35	2.70
Under .087 thru .062	Under .085 thru .060	2.90	2.90	2.90	3.10
Under .062 thru .046	Under .060 thru .044	3.40	3.40	3.40	3.70
Under .046 thru .037	Under .044 thru .036	3.85	3.85	3.85	4.35
Under .037 thru .033	Under .036 thru .032	4.25	4.25	4.25	4.85
Under .033 thru .029	Under .032 thru .028	4.75	4.75	4.75	5.35
Under .029 thru .026	Under .028 thru .025	5.05	5.05	5.05	5.75
Under .026 thru .023	Under .025 thru .022	5.60	5.60	5.60	6.35
Under .023 thru .021	Under .022 thru .020	6.05	6.05	6.05	6.95
Under .021 thru .019	Under .020 thru .018	6.50	6.50	6.50	7.55
Under .019 thru .018	Under .018 thru .017	7.10	7.10	7.10	8.30

Revised Effective 10/15/10

Restricted coating weight distribution extra is included in this table.



## General Extras

Refer to the General Pricing Section for the following: inventory and storage program, chemistry extras (including specified chemistry), item quantity, specific coil weight, test reporting, restricted tolerances, and packaging.

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## ASHLAND MANUFACTURING LIMITS

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### Ashland Galvanneal

Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge Min.	Min. Gauge Max.	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0230-0.0244	0.0225-0.0235	54	0	0	60
0.0245-0.0303	0.0236-0.0293	63	48	48	63
0.0304-0.0403	0.0294-0.0393	63	63	63	63
0.0404-0.0503	0.0394-0.0490	63	63	63	63
0.0504-0.0603	0.0491-0.0588	63	63	63	63
0.0604-0.0669	0.0589-0.0653	63	61	61	63
0.0670-0.0672	0.0654-0.0686	CSA (max. 63)	CSA (max. 61)	CSA (max. 61)	CSA (max. 63)
0.0673-0.0748	0.0687-0.0730	CSA (max. 63)	CSA (max. 61)	CSA (max. 61)	CSA (max. 63)

Cross Sectional Area (CSA) Limit: Max width = 4.20/gauge

If ordered Cut Edge, the width is 1 inch less than shown in the table.

24 inch I.D. only, minimum coil width – 20 inches.

Inquire for availability for orders above width limits (<63") on Med C and HSLA class material.

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## ROCKPORT MANUFACTURING LIMITS

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### Rockport Galvanneal

Specified Thickness (inches)		Coil Width (inches)			
Nom. Gauge	Min. Gauge	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0245-0.0269	0.023-0.0249	64	N/A	N/A	64
0.027-0.0319	0.025-0.0299	75	N/A	N/A	68
0.032-0.0419	0.030-0.0399	80	70	70	80
0.042-0.0729	0.040-0.0699	80	76	76	80
0.073-0.080	*0.070-0.0765	76	76	76	76

\* 0.078" is the max gauge for HSLAS.

\* Inquire for availability on Bakehard orders.

\* Inquire for availability on orders 77" - 80" wide.

\* Inquire for availability on orders 40" - 45" wide.

# ZINCGRIP ELECTRASMOOTH Steel

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## PRODUCT DESCRIPTION

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### Products

ZINCGRIP® ELECTRASMOOTH™ Steel is a carbon sheet product coated with an electrolytically deposited coating of zinc or zinc-nickel. The product is available in a variety of coating weights depending upon the protection desired. ZINCGRIP ELECTRASMOOTH Sheet products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to minimum thickness. The product is described in ASTM A 879, ASTM A 917, and ASTM A 918.

### Works Price Base Per 100 Pounds

ZINCGRIP ELECTRASMOOTH Galvanized . . . . . Inquire  
 ZINCGRIP ELECTRASMOOTH Zn-Ni Galvanized . . . . . Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Drawing Steel Type B . . . . .	.60
Extra Deep Drawing Steel . . . . .	4.00
Extra Deep Drawing Steel Plus . . . . .	4.25
Specified Hardness – Applies to .026" thickness and heavier (Min., Max. or 15 Point Minimum Rockwell B Range) . . . . .	.60
*Specified Mechanical Properties . . . . .	1.25
Bake Hardenable	
BH 180 . . . . .	2.05
BH 210 . . . . .	2.25
BH 250 . . . . .	2.50
Dent Resistant	
DR 180/190 . . . . .	3.75
DR 210 . . . . .	4.00
Formable/High Strength	
Low Alloy Steel Grade 40 (a) . . . . .	3.95
Formable/High Strength	
Low Alloy Steel Grade 50 ASTM A1008 (a) . . . . .	4.10

(a) Test reports are included in the extra.

\* Cannot test Rockwell ranges < .026"

## Size Extras

Thickness and width extras for ZINCGRIP ELECTRASMOOTH Steel products are to be taken from the table below. After the width and thickness extra is established, the extras for the Zinc coating from the appropriate coating category table are to be added.

Thickness (inches)		Master Coil Width (inches)			
Nominal	Minimum	24 to under 46	46 to under 64	64 to 72	Over 72
.0635 & heavier	.061 & heavier	INQ	INQ	INQ	INQ
Under .0635 thru .029	Under .061 thru .028	3.50	0	1.25	INQ
Under .029 thru .025	Under .028 thru .024	4.00	4.00	3.00	INQ
Under .025 thru .021	Under .024 thru .020	6.50	6.50	5.00	INQ
Under .021	Under .020	INQ	INQ	INQ	INQ

## Coating Extras

Specified to ASTM A 879 Coating Designation Only  
 Extras for the coating weights listed apply to zinc coatings. Electrolytic coatings are to be specified in grams/square meter for each side. The first number in the coating weight designates the unexposed side. The second number in the coating weight designates the exposed side. Standard practice unless requested is to supply coils prime side out. Coating weights other than those specified are subject to inquiry for availability. However, the extra for the next higher category will apply.

Thickness (inches)		Coating Extras — Extras apply to each side separately							
G/Sq. M SST per side		20G Min.	30G Min.	40G Min.	50G Min.	60G Min.	70G Min.	90G Min.	98G Min.
Nominal	Minimum								
.062 & Heavier	.060 & Heavier	INQ	INQ	INQ	INQ	INQ	INQ	INQ	INQ
Under .062 thru .046	Under .060 thru .044	1.75	1.75	1.75	1.75	2.05	2.35	3.10	3.55
Under .046 thru .037	Under .044 thru .036	2.05	2.05	2.05	2.05	2.35	2.80	3.55	3.85
Under .037 thru .033	Under .036 thru .032	2.35	2.35	2.35	2.35	2.80	3.10	3.85	4.15
Under .033 thru .029	Under .032 thru .028	2.80	2.80	2.80	2.80	3.10	3.55	4.15	4.55
Under .029 thru .026	Under .028 thru .025	3.10	3.10	3.10	3.10	3.55	3.85	4.55	4.85
Under .026 thru .024	Under .025 thru .023	3.55	3.55	3.55	3.55	3.85	4.15	4.85	5.15
Under .024 thru .020	Under .023 thru .019	3.70	3.70	3.70	3.70	4.05	4.35	5.05	5.35

Revised Effective 10/15/10

Zinc-Nickel Coating Specified to ASTM A 918 Coating weights other than those specified are subject to inquiry for availability; however, the extra for the next higher coating weight will apply. **Extras shown include the total coating on both sides.**

Thickness (inches)		Zn-Ni Coating Extras – Both Sides		
G/Sq. M Nominal	Minimum	20N/20N	30N/30N	40N/40N
.062 & Heavier	.060 & Heavier	INQ	INQ	INQ
Under .062 thru .046	Under .060 thru .044	INQ	INQ	INQ
Under .046 thru .037	Under .044 thru .036	INQ	INQ	INQ
Under .037 thru .033	Under .036 thru .032	INQ	INQ	INQ
Under .033 thru .029	Under .032 thru .028	INQ	INQ	INQ
Under .029 thru .025	Under .028 thru .024	INQ	INQ	INQ
Under .025 thru .021	Under .024 thru .020	INQ	INQ	INQ

#### Organic Coating

The coating weight extras for organic coating are in addition to the coating weight extras for ZINCGRIP ELECTRASMOOTH Zn-Ni Steel shown above. **Extras apply to each side separately.**

Thickness (inches)		Organic Coating Extras – One Side
G/Sq. M Nominal	Minimum	Extra in Addition to Zn-Ni EG Coating Weight Extra
.065 thru .062	.060 & Heavier	INQ
Under .062 thru .046	Under .060 thru .044	INQ
Under .046 thru .037	Under .044 thru .036	INQ
Under .037 thru .033	Under .036 thru .032	INQ
Under .033 thru .029	Under .032 thru .028	INQ
Under .029 thru .025	Under .028 thru .024	INQ
Under .025 thru .021	Under .024 thru .020	INQ

Zinc-Nickel Organic Coating must be outside processed. Final price must include freight from mill to processor and price quoted is F.O.B. processor with final freight to customer account.

#### Finish Extras

Grade E (exposed) . . . . . 6.00

#### Processing Extras

Refer to the Outside Processing section for dimensions not listed.

#### General Extras

Refer to the General Pricing Information section for the following: inventory extras, surface treatment extras, chemistry extras (including specified chemistry), item quantity, specified coil weight, test reporting, restricted tolerances, and packaging.

## MIDDLETOWN MANUFACTURING LIMITS

### ELECTROGALVANIZED

Specified Thickness (inches)				Coil Width (inches)			
Nom. Gauge		Min. Gauge		Low C	Med C	Strl Stl/	
Min.	Max.	Min.	Max.			HSLAS	Ult Low
0.0215	0.0225	0.020	0.0217	60	50	50	50
0.0226	0.0240	0.0218	0.0229	63	60	50	63
0.0241	0.0253	0.0230	0.0239	64	60	50	64
0.0254	0.0303	0.0240	0.0292	72	60	50	75
0.0304	0.0354	0.0293	0.0341	75	60	55	75
0.0355	0.0450	0.0342	0.0436	75	70	60	75
0.0451	0.0630	0.0437	0.0616	75	75	71	75
0.0631*	0.0700	0.0617*	0.0686	CSA (max. 75)	CSA (max. 66)	CSA (max. 64)	CSA (max. 75)
0.0701*	0.080	0.0687*	0.080	CSA (max. 68)	CSA (max. 66)	CSA (max. 64)	CSA (max. 68)

Cross Sectional Area (CSA) Limit: Max width = 5.46/gauge

Inquire on 2 side heavy weight coatings (90G/90G, 98G/98G and 98G/90G)

\* Inquire for availability

## CLEVELAND MANUFACTURING LIMITS

### ELECTROGALVANIZED

Specified Thickness (inches)				Coil Width (inches)			
Nom. Gauge		Min. Gauge		Low C	Med C	Strl Stl/	
Min.	Max.	Min.	Max.			HSLAS	Ult Low
0.0215	0.0225	0.0200	0.0217	60	50	50	50
0.0226	0.0240	0.0218	0.0229	63	60	50	63
0.0241	0.0253	0.0230	0.0239	64	60	50	64
0.0254	0.0303	0.0240	0.0292	72	60	50	72
0.0304	0.0354	0.0293	0.0341	72	60	55	72
0.0355	0.0450	0.0342	0.0436	72	70	60	72
0.0451	0.0500	0.0437	0.0486	72	72	64	72
0.0501	0.0670	0.0487	0.0656	CSA (max. 72)	CSA (max. 66)	CSA (max. 64)	CSA (max. 72)

Cross Sectional Area (CSA) Limit: Max width = 3.6/gauge

Inquire outside these limits for availability

# General Pricing Information

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## EXTRAS PER 100 POUNDS

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These general extras apply to prices not found in the specific product pricing sections.

### Inventory Storage Program

Note: In those cases where the costs associated with a specific program are different than AK Steel's published extra, we reserve the right to charge an extra that would be equal to the actual costs of the Inventory/Storage program.

Customer Inventory or Storage Program . . . . . .45

### Finish Extras

EXTRASMOOTH® or Temper Rolled . . . . . 1.50  
 Exposed Grade E . . . . . 6.00

### Surface Treatment Extras

Our standard practice includes the application of an oil and/or chemical treatment for protection from storage stain/rust.

Oil (type not specified) . . . . . None  
 Standard Chemical Treatment . . . . . None  
 Prelube Coating (conventional type) . . . . . .60

### Specified Coil Weight

400 pounds per inch of width and over . . . . . None  
 Under 400 thru 200 pounds per inch of width . . . . . 2.00  
 Under 200 pounds per inch of width . . . . . 3.00

### Chemistry Extras

AISI-SAE Grade:  
 When ordering the standard SAE chemistry of  
     1010, 1012, 1015 . . . . . .50  
     1006, 1008 . . . . . None

Specified Chemistry:  
 When specifications for carbon and/or manganese indicate maximums only, with the limits of carbon 0.08% thru 0.18% and/or manganese 0.45% thru 0.60% . . . . . None

For other association grades, chemistry range restrictions or customer specified chemistry, the following chemistry extras apply.

Maximum of Carbon Range	Maximum of Manganese Range		
	thru 0.60	0.61 thru 0.90	0.91 thru 1.15
Specified less than 0.04	.50	-	-
0.04 thru 0.10	.25	.40	.60
0.11 thru 0.20	.40	.50	.60
0.21 thru 0.25	.75	1.00	1.15
Carbon and Manganese other than listed above			NA

### SAE Chemical Composition Range

SAE No.	Heat Chemical Composition Limits, %			
	Carbon	Manganese	Phosphorus	Sulfur
1006	0.08 max.	0.45 max.	0.030	0.035
1008	0.10 max.	0.50 max.	0.030	0.035
1009	0.15 max.	0.60 max.	0.030	0.035
1010	0.08-0.13	0.30-0.60	0.030	0.035
1012	0.10-0.15	0.30-0.60	0.030	0.035
1015	0.12-0.18	0.30-0.60	0.030	0.035
1016	0.12-0.18	0.60-0.90	0.030	0.035
1017	0.14-0.20	0.30-0.60	0.030	0.035
1018	0.14-0.20	0.60-0.90	0.030	0.035
1019	0.14-0.20	0.70-1.00	0.030	0.035
1020	0.17-0.23	0.30-0.60	0.030	0.035
1021	0.17-0.23	0.60-0.90	0.030	0.035
1022	0.17-0.23	0.70-1.00	0.030	0.035
1023	0.19-0.25	0.30-0.60	0.030	0.035

Although the maximum amounts of phosphorus and sulfur are 0.030 and 0.035 percent respectively, our normal practice produces significantly lower levels for both elements.

### Carbon and Manganese

For more restricted than standard SAE

(see SAE Table on page 13.2) . . . . . NA

### Phosphorus

When a range is specified or required . . . . . .50

When restricted to less than 0.025% max. . . . . .50

### Copper

When specified, or for any minimum through 0.20% . . . . . .50

When restricted to below 0.02% max. . . . . .40

### Sulphur

When specified or required (includes resulfurized grades) . . . . . .40

When restricted to less than .015% to .009% . . . . . .50

When restricted to less than .009% . . . . . .1.00

For specified chemistries or chemistry tolerances other than shown, please contact your AK Steel Sales Representative.

**Test Reporting**

Standard Ladle Analysis	
One ladle analysis per heat of steel is supplied on the corresponding AK Steel Invoice and/or shipping notice . . .	None
Standard Test Reporting	
When the reporting of test data is for specification compliance, standard test reports include mechanical properties, bend tests, hardness tests, and coating weight tests . . . . .	.25
Test Coupon	
When separate sample material (coupons) is ordered . . . . .	1.00
Test coupons may not be available for all products. Please inquire with your AK Steel Representative.	
Special Test Reporting	
When non-standard testing and/or customized reports are required . . . . .	1.00

**Restricted Tolerances**

When thickness, width, length, or flatness tolerances are specified or required closer than standard, such tolerances will be considered on the basis of our ability to produce. Assessment of appropriate extras will be determined by analyzing the added scrap loss, labor, and machine time necessary to accomplish.

Restricted Gauge Tolerance . . . . .	2.25
Reference tables on pages 3.7 and 3.8 for standard AK gauge tolerances.	
Restricted Width Tolerance	
Please contact your AK Steel Sales Representative for width tolerance extras.	
Special Flatness Requirement	
(Tension levelling – includes cropping to thickness) . . . . .	3.25

**Packaging**

The ordered item weight determines the extra if the buyer does not specify a package weight less than the ordered item weight. In the latter case, the specified smaller package weight will determine the extra.

Standard Packaging as described in the General Product Information section.	
Coils or Cut Lengths 15,000 pounds and over . . . . .	None
Coils or Cut Lengths under 15,000 pounds and over . . .	10.00/unit

## Non-Standard Packaging

Packaging Type	Coils	Cut Lengths
	Dollars/Unit	Dollars/Unit
Paper – Additional Layer	8.00	8.00
Bands – Each Extra Band	5.00	5.00
Skeleton Platforms	25.00	25.00
Skids – Each	10.00	10.00
Plastic Inside Diameter Ring	20.00	–
Steel Inside Diameter Ring	20.00	–
Metal Protective Sheets or Waster Sheets	–	15.00
Fiberboard		
– Inside Diameter Ring	9.00	–
– Outside Diameter Ring	18.00	–
– Outside Wrap	20.00	–
– Donut	6.00	–
– Protective Sheets (shock paper)	–	20.00
Fiber Core Inserts	10.00	–
Special Protective Devices – Bumper Blocks, etc.	10.00	10.00

### Special Protective Package – Contact your AK Steel Representative

P537	44.00/Unit
P538	64.00/Unit
P539	58.00/Unit
P546	20.00/Unit
P547	64.00/Unit
P548	20.00/Unit
P549	20.00/Unit
P554	90.00/Unit
P555	20.00/Unit
P557	64.00/Unit
P558	20.00/Unit

# Outside Processing

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## SERVICES

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Often our valued customers require products which AK Steel until now, did not have the capability to economically provide. Today, however, AK Steel can provide the following services through selected quality processors: Edge Trimming, Shearing, Levelling, Painting, Welding, Slitting, Blanking, Pickling, and Tension Levelling. AK Steel can provide processed steel products through selected quality regional processors.

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## PROCESSING

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### **Single Billing for Ease of Control**

Customers' administration costs are kept to a minimum because the customer only makes one phone call and gets only one invoice for the steel that is needed. Electronic transmission of order status is being implemented to provide you — our customer — accurate, timely data. Bar coded shipping tags are also available.

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## HOW TO ORDER

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For further information on how these services can work for you, please contact your local AK Steel Representative or call our Customer Service Center toll-free number 1-800-331-5050.

### **Tolerances**

Gauge tolerance for a slit width coil is equal to the published AK Steel gauge tolerance associated with the master coil. Other tolerances are dependent upon processor capabilities.

## Hot Rolled Sheet

### Definition:

Processing is an extra applied to the Hot Rolled Processed Sheet base price. Slit coil process extras, expressed as thickness and width extras in the following table, include all processing costs associated with slitting mill-produced wide coils to the customer's specified width, including the cut edge extra.

### Thickness and Width

Thickness (inches)		Slit Width (inches)		
Nominal	Minimum	3 to under 12	12 to under 24	24 to under 46
.259 and thicker	.250 and thicker	Inquire	Inquire	Inquire
Under .259 thru .188	Under .250 thru .180	Inquire	Inquire	Inquire
Under .188 thru .097	Under .180 thru .090	Inquire	Inquire	Inquire
Under .097 thru .076	Under .090 thru .071	Inquire	Inquire	Inquire

These extras include the master coil thickness and width extra.

### Pickled (Oiled or Dry):

The following Pickle processing extras include all processing costs associated with pickling mill produced coils at an authorized processor when the product required is beyond our mill producing capabilities, or when a customer specifies or requires an outside processor to be used.

### Carbon – thru .25% Max., High Strength and ASTM/ASME A 414

Thickness (inches)		Mill Edge	Cut Edge
Nominal	Minimum		
.180 and over	.172 and over	Inquire	Inquire
Under .180 thru .076	Under .172 thru .071	Inquire	Inquire

For Carbon over .25% add \$.25/cwt to the above extras.

Dry Lube and Mill Bond (excluding pickling charge) . . . . . Inquire

### Cut-To-Length:

Extras to be added to the price of coils – 24 inches and wider.

Length (inches)	
36 to Under 72	Inquire
72 thru 180	Inquire
Over 180	Inquire

Widths under 24 inches on inquiry; lengths under 36 inches on inquiry.

**Cold Rolled Sheet,  
Coated Carbon Sheet**  
(Aluminized, HDG, EG, GA)

Definition:  
Processing is an extra applied to the Cold Rolled Sheet base price. Slit coil processing extras, expressed as thickness and width extras in the following table, include all processing costs associated with slitting mill produced wide coils to the customer's specified width.

**Thickness and Width**

Thickness (inches)		Slit Width (inches)	
Nominal	Minimum	3 to under 12	12 to under 24
.0635 and heavier	.061 and heavier	5.50	4.00
Under .0635 thru .029	Under .061 thru .028	5.50	4.00
Under .029 thru .025	Under .028 thru .024	5.50	4.50
Under .025 thru .021	Under .024 thru .020	7.00	6.50
Under .021	Under .020	INQ	INQ

These extras include the master coil thickness and width extra.

Cut-To-Length: (Excludes Developed Blanks, Parallelgrams, Trapezoids)  
**Extras to be added to the price of coils – 24 inches and wider.**

Thickness (inches)		Length (inches)	
Nominal	Minimum	36 to under 72	72 thru 180
.019 thru .023	.018 thru .022	Inquire	Inquire
.024 thru .041	.023 thru .039	Inquire	Inquire
.042 and thicker	.040 and thicker	Inquire	Inquire

**Aluminized Steel  
Type 1 Stainless 409 & 439**

Definition:  
Processing is an extra applied to the Aluminized Steel Type 1 409 and 439 base price. Slit coil processing extras including edge trim, expressed as thickness and width extras in the following table, include all processing costs associated with slitting mill produced wide coils to the customer's specified width.

**Thickness and Width**

Thickness (inches)		Slit Width (inches)	
Nominal	Minimum	3 to under 12	12 to under 24
.018 thru .0299		Inquire	27.40
.030 thru .0349		Inquire	16.15
.035 thru .0459		Inquire	6.90
.046 thru .079		Inquire	6.90

These extras include the master coil thickness and width extra.

Cut-To-Length:

Extras to be added to the price of coils – 24 inches and wider.

Thickness (inches)	Length (inches)	
Nominal	36 to under 72	72 thru 180
Contact your AK Representative.		

**Prepainted Sheet**

Pricing:

AK Steel Prepainted Sheet products are priced on an individual inquiry basis because of the wide variety of substrate and paint coating combinations. Pricing is based on actual weight, and includes the substrate base price, appropriate extras, freight costs to toll coater, and coater painting costs. Prepainted is sold F.O.B. coil coater.

**Developed Blanks**

Due to the unique requirements of special blanks and non uniform cut-to-length sizes, all inquiries for these shapes must be individually quoted. AK Steel must have specific drawings and specifications, including tolerances, in order to build up the blank weights and pricing for these items.

**General Extras All Grades**

Carbon Coil Breakdown and/or Edge Trim . . . . .	3.50
Aluminized Steel Type 1 Stainless Coil Breakdown . . . . .	4.90

**Customer Service Center  
1-800-331-5050**

Call 24 hours a day, seven days a week to place orders, make inquiries or obtain a response on any issue.



**AK Steel Corporation**  
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[www.aksteel.com](http://www.aksteel.com)