COMPOSITE MATERIALS
شركة قضبان بديلة للصناعة
AL TERNATIVE REBAR PLANT

رؤيـــة VISION
2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

ALTERNATIVE REBAR PLANT

www.alternativerebar.com

Glass Fiber-Reinforced Polymer (GFRP)

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Company Overview

Alternative Rebar Plant

ARP was established in 2019 with an agreement with a Canadian Technology Supplier (Tuf-Bar Inc.) who has more than 25 years of experience.

ARP is using cutting-edge technology in manufacturing GFRP bars that meet the highest standards.

ARP GFRP products are in compliance with the Saudi Standards (SASO), ARAMCO, and relevant ASTM and CSA Standards.

Alternative Rebar Plant

ISO Certified and has full in-house QC Equipment.

Partnership with University of Sherbrooke - Canada: NSERC Industrial Research Chair in FRP Composites for Concrete Infrastructure.

ARP GFRP Products

45 GPa	Straight and Bent Bars	From #2 to #12 (6 mm to 38 mm)
50 GPa	Straight and Bent Bars	From #2 to #8 (6 mm to 25 mm)
60 GPa	Straight and Bent Bars	From #2 to #12 (6 mm to 38 mm)

ARP GFRP Products

Custom solutions for special projects

Up to 1000 m of # 8 (25 mm)

A Historical Overview of The Product

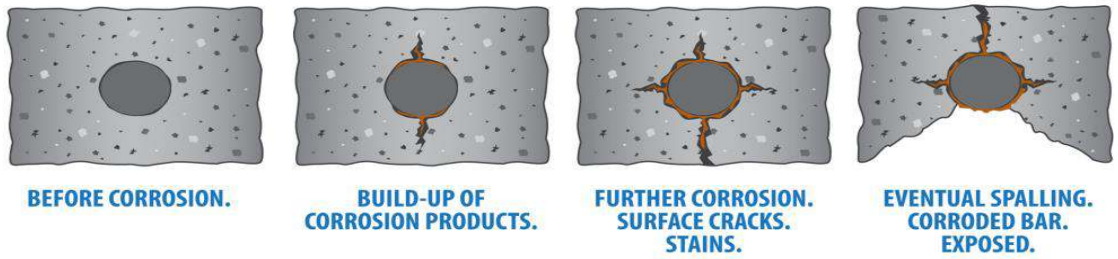
A Historical Overview Of The Product

1930-1940	Experiments began on polymer reinforced with glass fibers (fiberglass).
1940 - 1950	During World War II, fiberglass started to be used in warplanes for its light weight and high strength.
1950-1960	After the war, its use expanded into many industries, including automobiles, ships, and building components.
1970-1980	Developments and improvements were made to the polymer and production methods to increase strength and cohesion.
1990-Present	The global building code update and specification development began.

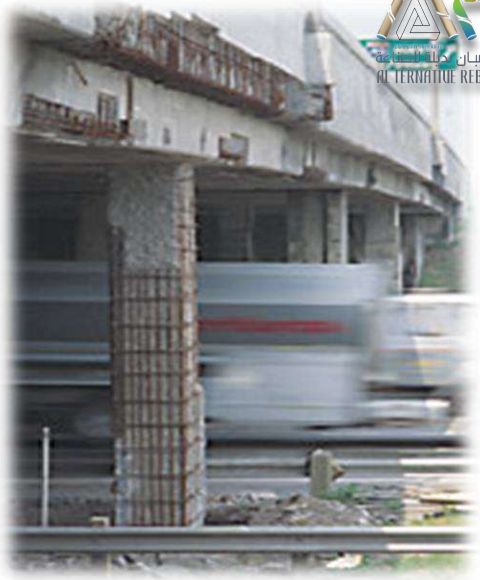
Corrosion Problems

Steel corrosion in reinforced concrete (RC) structures is a major cause of deterioration of infrastructure projects.

Steel can expand 10x in volume when it rusts and causes concrete to crack and fail.



The corrosion cycle of steel begins with the rust expanding on the surface of the bar and causing cracking near the steel/concrete interface. As time marches on, the corrosion products build up and cause more extensive cracking until the concrete breaks away from the bar, eventually causing spalling.



Corrosion Problems

- Epoxy Coated Steel: Corrodes
- Galvanized Steel: Corrodes
- Stainless Steel: Susceptible

Cracking with Epoxy Coated Steel,
19-Year-Old Ontario Bridge, MTO 2005

Failure with Stainless Steel,
Roof of 13-Year-Old Swimming
Pool Collapses, Switzerland

Rusting Stainless Steel in Bridge Install
Anthony Henday, Edmonton AB

Cracking with Galvanized Steel,
23 Yr Old Ontario Bridge, MTO 2007

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GFRP Advantages

GFRP Advantages

Fewer Concrete Additives

No Concrete Treatments
No Protective Membranes
No Rebar Coating Repairs

Lightweight
Lower Transport Costs
Less Handling
Less Injuries (WCB/OSHA)

Thermal Isolator
Non-Conductive
Non-Magnetic

GFRP Advantages

Sustainable and Environmentally Friendly

100 + Years Concrete Reinforcement

3 x Tensile Strength of Steel

Minimal Concrete Cover

GFRP Applications

GFRP Applications

01

Bridge Decks & Infrastructure

02

Parking Garages

MRI Rooms

03

GFRP Applications

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Marine Applications

04

05 Barrier Walls / Sea Walls

LRT and Rail Tracks

06

GFRP Applications

07

Power Generation Plants

08

Water Treatment Facilities

09

Tunnels

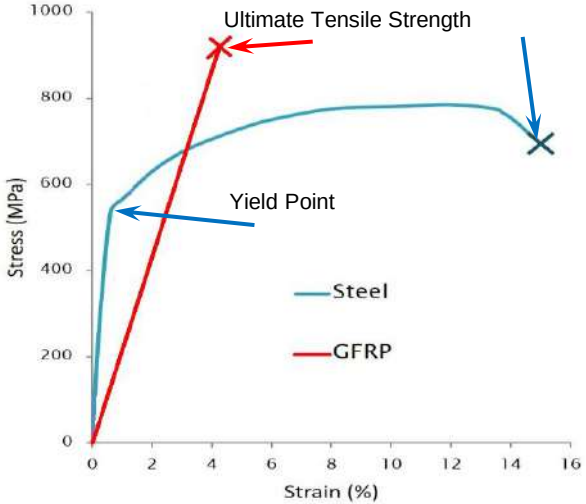
Testing & Quality Control

Quality & Testing

The product undergoes 18 tests, including 9 physical tests and 9 mechanical tests, to ensure the product meets the specification

Things to Know

- Modulus of Elasticity
  - ¼ that of Steel
  - Tensile strength > that of steel
- Elongation
  - Elongates Linearly 2%
  - Not Ductile
- Design
  - Serviceability Limit State (SLS)
  - Ultimate Limit State (ULS)
- Bond-Dependent Coefficient, Kb Factor
  - Crack Width < 0.5 mm for severe exposure, and 0.7 elsewhere.
  - Sand Coated GFRP bars kb = 0.8

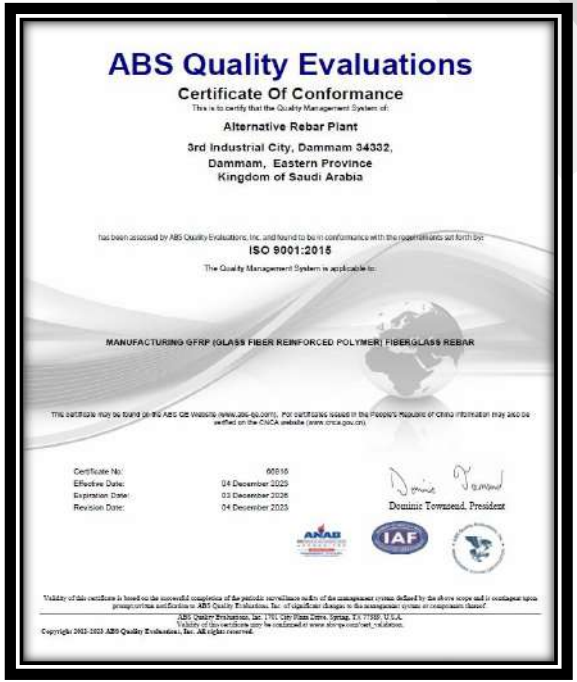


Stress-Strain Curves

Sand Coated by ARP

Certifications

ISO 9001: Quality Management System
ISO 14001: Environmental Management Systems
ISO 45001: Occupational Health And Safety Management Systems



ABS Quality Evaluations

Certificate Of Conformance

This is to certify that the Quality Management System of:

Alternative Rebar Plant

3rd Industrial City, Dammam 34332,

Dammam, Eastern Province

Kingdom of Saudi Arabia

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

ISO 9001:2015

The Quality Management System is applicable to:

MANUFACTURING GFRP (GLASS FIBER REINFORCED POLYMER) FIBERGLASS REBAR

This certificate may be found on the ABS QE Website (www.abs-qe.com). For certificates issued in the People's Republic of China information may also be verified on the CNCA website (www.cnca.gov.cn).

Certificate No: 66016
Effective Date: 04 December 2023
Expiration Date: 03 December 2026
Revision Date: 04 December 2023

Dominic Townsend, President

Validity of this certificate is based on the successful completion of the periodic surveillance audits of the management system defined by the above scope and is contingent upon prompt written notification to ABS Quality Evaluations, Inc. of significant changes to the management system or components thereof.

ABS Quality Evaluations, Inc. 1701 City Plaza Drive, Spring, TX 77389, U.S.A.

Validity of this certificate may be confirmed at www.abs-qe.com/cert_validation.

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ABS Quality Evaluations

Certificate Of Conformance

This is to certify that the Environmental Management System of:

Alternative Rebar Plant

3rd Industrial City, Dammam 34332,

Dammam, Eastern Province

Kingdom of Saudi Arabia

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

ISO 14001:2015

The Environmental Management System is applicable to:

MANUFACTURING GFRP (GLASS FIBER REINFORCED POLYMER) FIBERGLASS REBAR

This certificate may be found on the ABS QE Website (www.abs-qe.com). For certificates issued in the People's Republic of China information may also be verified on the CNCA website (www.cnca.gov.cn).

Certificate No: 66017
Effective Date: 04 December 2023
Expiration Date: 03 December 2026
Revision Date: 04 December 2023

Dominic Townsend, President

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ABS Quality Evaluations

Certificate Of Conformance

This is to certify that the Occupational Health and Safety Management of:

Alternative Rebar Plant

3rd Industrial City, Dammam 34332,

Dammam, Eastern Province

Kingdom of Saudi Arabia

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

ISO 45001:2018

The Occupational Health and Safety Management is applicable to:

MANUFACTURING GFRP (GLASS FIBER REINFORCED POLYMER) FIBERGLASS REBAR

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Certifications

MEMORANDUM OF UNDERSTANDING FOR COLLABORATION

BETWEEN

SAUDI ARABIAN OIL COMPANY

AND

ALTERNATIVE REBAR PLANT

This document does not constitute a legally binding agreement; is being used solely for ceremonial signing purposes; shall not be used for any other purpose; and, does not represent or serve as a commitment of the award of any agreement between any of the parties referenced herein.

Saudi Aramco: Confidential

Aramco MOU

تأكيد العضوية في برنامج صنع في السعودية

السادة شركة قضبان بديلة للصناعة

السلام عليكم ورحمة الله وبركاته، وبعد،

نرحب بكم أعضاء في برنامج "صنع في السعودية" ويسعدنا انضمامكم للبرنامج ومساهمتكم في تحقيق أهدافه الرامية إلى تعزيز الثقة بالمنتج الوطني وتفعيل دوره في تنمية الناتج المحلي السعودي غير النفطي، مما يساهم في جعل المملكة قوة صناعية رائدة وفقاً لأهداف رؤية السعودية 2030.

بعد هذا المطلب بمثابة تأكيد على أن شركتكم المؤهَّلة والمنتجات المسجلة والمُوافق عليها تستوفي المعايير المطلوبة للانضمام لبرنامج صنع في السعودية، على أن يمتثل جميع الأعضاء امتثالاً كاملاً للقواعد البرنامج طوال فترة صلاحية العضوية واعتباراً من تاريخ هذا المطلب يحق لشركتكم استخدام علامة "صناعة سعودية" على المنتجات المسجلة والمعتمدة، والاستفادة من مزايا العضوية.

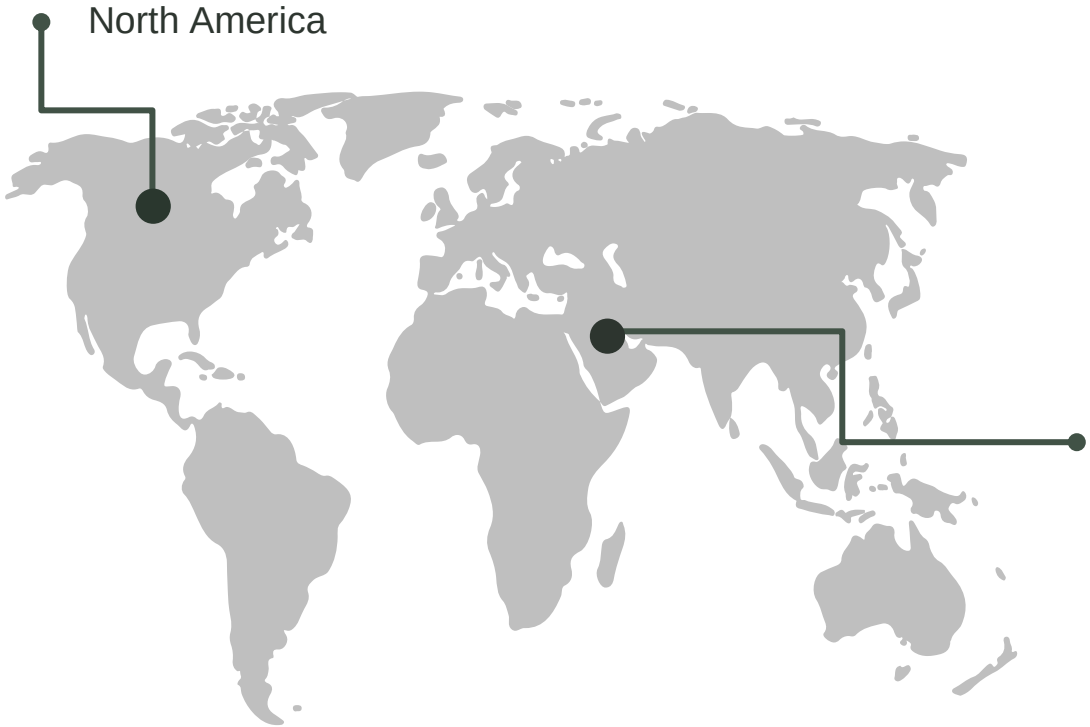
وبناءً عليه، نأمل منكم تعريف جميع الموظفين المعنيين بتطبيق العلامة الصناعية بقواعد البرنامج وإرشادات استخدامها على المنتجات والعروض الترويجية الخاصة بالشركة.

مدير عام إدارة صنع في السعودية

أ. فيصل بن أحمد المغلوث

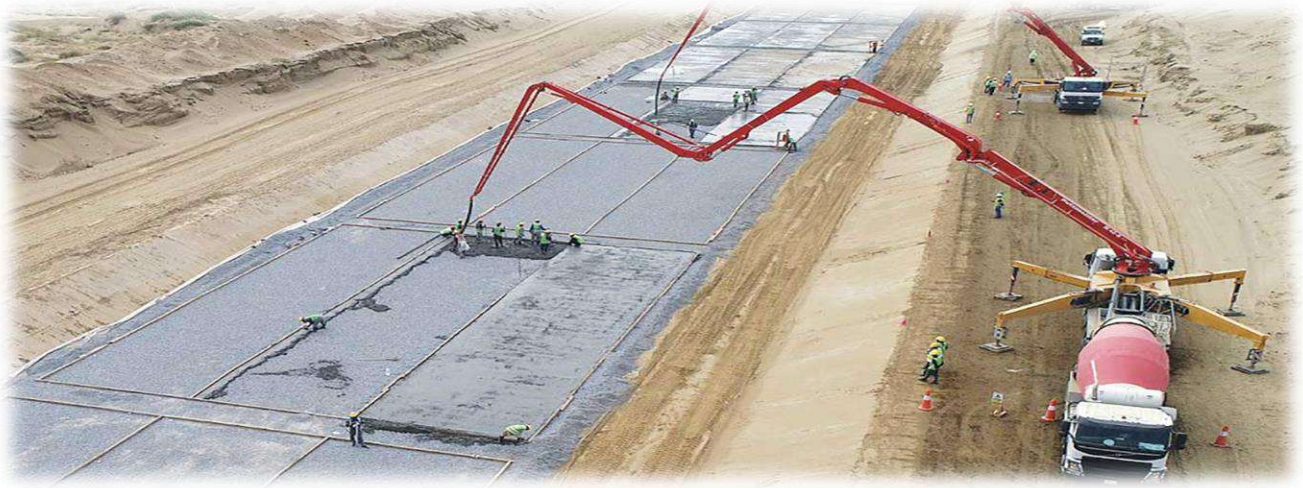
Saudi Made

Company Representative



Projects

Jizan Flood Mitigation Channel



The World’s Largest GFRP-Reinforced Concrete Project (21 km long).

- Original design was made with ECS for a 50-year service life, during which minor maintenance would be needed.
- The design was changed to GFRP with expected maintenance-free service life of a 100 years.

King Salman Energy Park (Spark)

- Life cycle cost analysis showed savings of just over 314,462 USD are anticipated with the GFRP option in the 100-year period.

Neils Brook Bridge Replacement - Cape Breton Highlands National Park - Nova Scotia

GFRP is used in; Deck, Approach Slabs, Wingwalls & Abutments.
16,500 Meters of GFRP with 2,200 Meters in bent bars.

Projects by Tuf-Bar Inc.

Teed Bridge Replacement - Cumberland County Nova Scotia

Precast Bridge Deck, Barriers, Approach Slabs & Wing walls.

LRT Edmonton - Alberta

GFRP Bars in LRT Tacks

Projects by Tuf-Bar Inc.

Exporting Products Information

Product Name
Glass Fiber Reinforced Plastic
Glass Fiber Reinforced Polymer
Glass Fiber Reinforced
GFRP & FRP

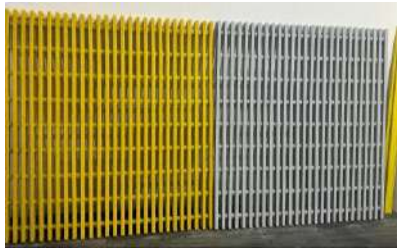
HS-Code International
39169090
39269099
70199090
3916905000

Other Product Name
GRP / FRP (Pipes Fittings / Spools/ Flanged /Tanks & Manholes).
FRP Inspection Chamber / Oil Separator / Mushroom Vent.
FRP Oduor Control / FRP Trench.
GRP Metering Cabinets Electrical and Water.
GRP Liners & Sheets.
GRP Fire Boxes & Portable Toilet & Frame.
Steel Metal Industries Products (Clamps & Channels & Angles & Ladders etc.) and customized on request.

Other Fiberglass Products

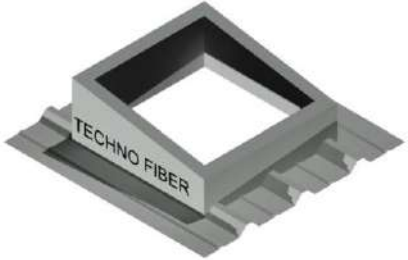
FRP Manhole

Electric Meter Boxed



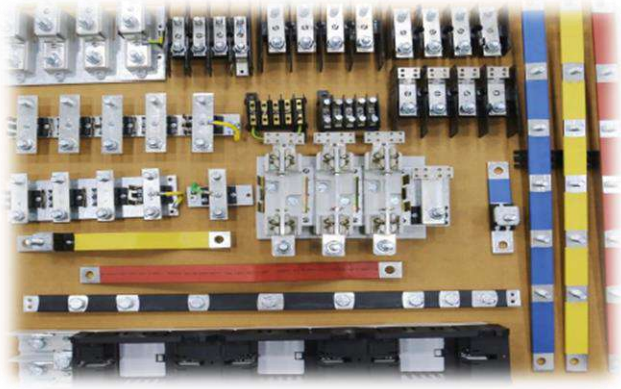
FRP Grating

Water Meter Boxed



FRP Window

Fiber Tanks



Electric Accessory

COMPOSITE MATERIALS

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AL TERNATIVE REBAR PLANT

Thank you!

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www.alternativerebar.com

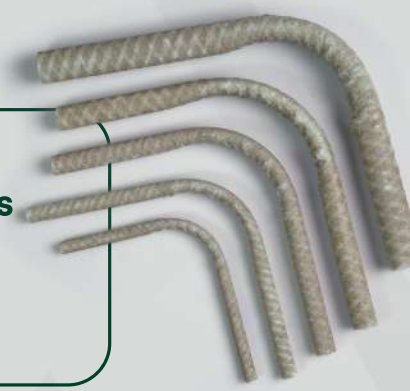
شركة قضبان بديلة للصناعة
ALTERNATIVE REBAR PLANT

Alternative Rebar Plant (ARP)

Fiberglass Rebar
60GPa Straight Bars

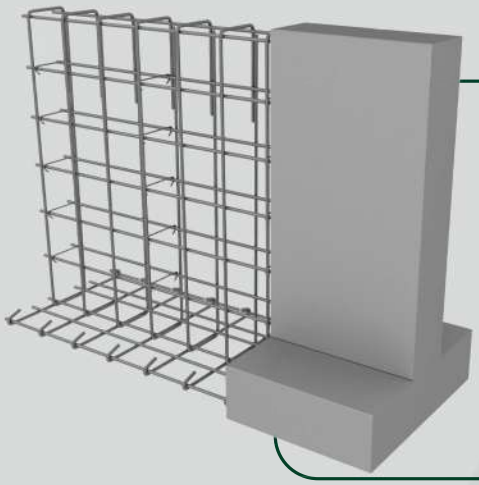
100+ Years Concrete Reinforcement

Ultimate Corrosion Solution



APPLICATIONS

- Bridge Decks and Barrier Walls
- Roads, Parking Garages and Concrete Slabs
- Power Generation and MRI
- Tunneling and Temporary Reinforcement
- Dams, Sea Walls and Marine Applications



GFRP ADVANTAGES

100+ Years Service Life
Durable and Sustainable Design
Corrosion Resistant
Maintenance-Free
1/4 The Weight of Steel
Up to 3x Tensile Strength of Steel
Non-Magnetic
Non-Conductive
Quick and Simple Installation
Low Environmental Impact

Contributes 7 LEED Credits
Bends in all sizes
Custom lengths

SAUDI MADE

ISO 9001 / ISO 14001 / ISO 45001

60 GPa
Alternative Rebar Plant (ARP)
Glass Fiber Reinforced Polymer (GFRP)

Product Data Sheet: ARP-BAR 60 Straight Bars

	Units	#3-60	#4-60	#5-60	#6-60	#7-60	#8-60
Nominal Diameter (CSA S807)	mm	10	13	15	20	22	25
	inch	3/8	1/2	5/8	3/4	7/8	1
Fiber Type		E-CR glass					
Resin Type		Vinyl ester					
Minimum Guaranteed Ultimate Tensile Strength (ASTM D7205 / CSA S806)	MPa	1200	1175	1150	1150	1100	1000
	ksi	174	170	167	167	160	145
Minimum Modulus of Elasticity (ASTM D7205 / CSA S806)	GPa	63.7	61.1	62.6	62.7	61.2	61.7
	ksi	9242	8868	9078	9091	8878	8944
Ultimate Elongation	%	2.2	2.1	2.1	2.0	1.9	1.9
Average Bond Strength (CASTM D7913)	MPa	13.7	12.7	14.6	14.1	13.6	13.5
	ksi	2.0	1.8	2.1	2.1	2.0	2.0
Transverse Shear Strength (ASTM D7617)	MPa	264.3	235.1	249.9	234.9	230.1	226.7
	ksi	38.3	34.1	36.2	34.1	33.4	32.9
Longditudinal Thermal Expansion Coefficient (ASTM E831)	10-6/°C	5.9	6.0	7.0	7.8	6.4	7.5
	10-6/°F	3.3	3.3	3.9	4.4	3.6	4.1
Transverse Thermal Expansion Coefficient (ASTM E831)	10-6/°C	21.2	20.1	22.8	23.3	25.9	25.6
	10-6/°F	11.8	11.2	12.7	12.9	14.4	14.2
Water Absorption (ASTM D570)	%	0.5	0.5	0.5	0.4	0.4	0.3
Linear Weight	g/m	195	339	526	742	990	1309
	lb/ft	0.13	0.23	0.35	0.50	0.67	0.88
Effective Cross-Sectional Area (Including Coating) (CSA S807 Annex A)	mm²	91	152	235	335	435	574
	inch²	0.141	0.236	0.364	0.519	0.674	0.890
Nominal Cross-Sectional Area (CSA S807)	mm²	71	129	199	284	387	510
	inch²	0.110	0.200	0.308	0.440	0.600	0.791

ARP-BAR 60 Straight Bars Comply with:

SASO-GSO-2488, Grade III
CSA S807, Grade III
ASTM D8505
MTO, Grade III

SAUDI MADE

Kingdom of Saudi Arabia,
Dammam 3rd Industrial City

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