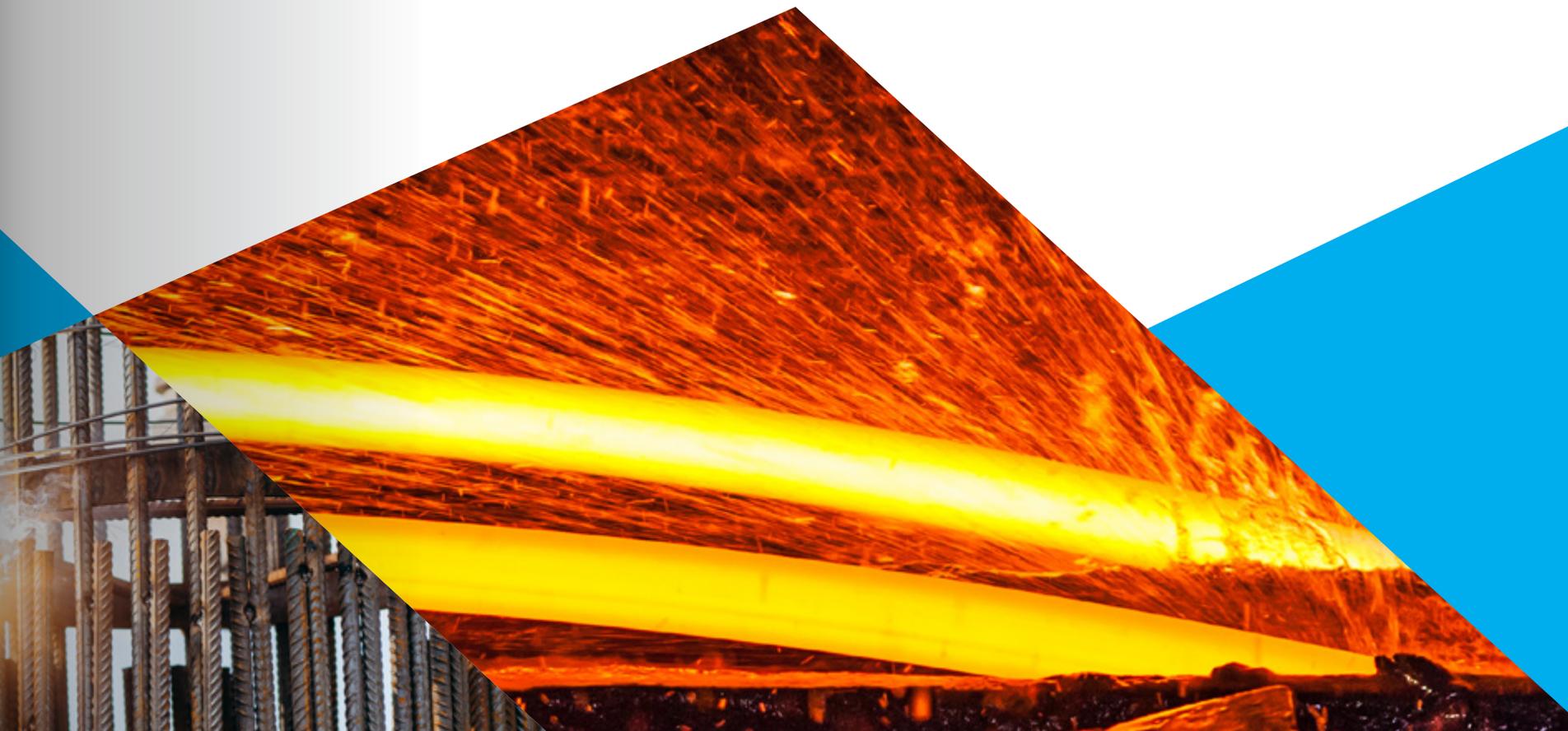


حديد الإمارات أركان
emirates steel arkan

I AM THE FOUNDATION OF TOMORROW
I AM ES600



I AM THE SUSTAINABLE CHOICE
I AM ES600



As the world moves toward making our future sustainable and suitable for the next generation to thrive in, we're busy working on how we can change the future of the construction industry.

 Introducing the **ES600** - An innovative, high-strength rebar that marks a new milestone in enabling sustainable construction.

 The **ES600** is a true disrupter and will be a game changer in the construction industry.

 **ES600** rebar supports sustainability and the UAE Vision 2050, by reducing the steel consumption in construction.

 On an average, about 1 ton of CO₂ emission is reduced per floor in tower construction. If a 40-storey tower is constructed, above 40 t of CO₂ emission is reduced.

I AM THE FUTURE OF CONSTRUCTION
I AM ES600

From the many benefits that the **ES600** offers, a few stand out as truly remarkable.

SAVE COST. SAVE TIME.



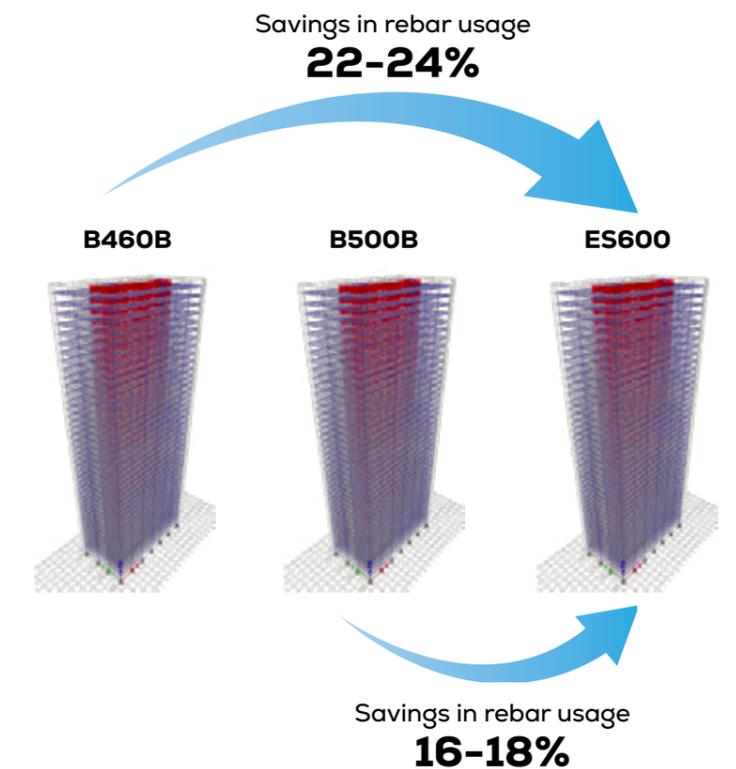
The **ES600** helps to save precious time and cost.



Use of **ES600** will reduce steel usage by **18-24%** in mid to high-rise construction.



The **ES600** offers numerous benefits to all stakeholders, the developer, the consultant, the contractor and the cut & Bend producer, the **ES600** will easily become the rebar of choice to all.



REDUCTION IN REBAR USAGE



High Rise building: **18-24%**



Mid Rise building: **18-24%**



Villa: **7-8 %**



Bridge: **13-15%**

*Depending on project type, original design and value engineering

REDUCTION ON LOGISTICS COSTS



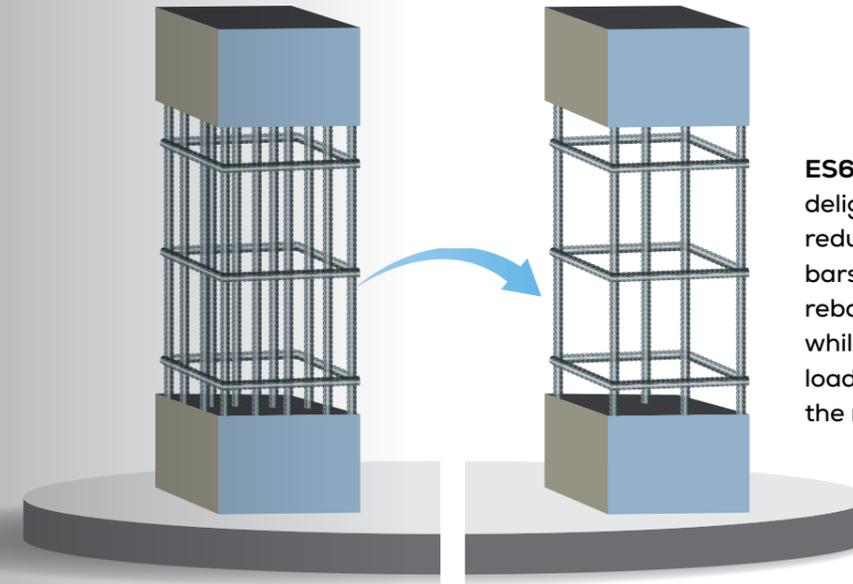
By reducing the steel usage, **ES600** helps reduce the transportation costs by 18%

REDUCTION IN STORAGE SPACE



As **ES600** helps in reduced steel usage, the storage space for rebars, required at the construction site is reduced by about 18%

REDUCTION IN REBAR CONGESTION



ES600 is a designer's delight as it helps reduce the number of bars and/or the size of rebars, in any structure, while maintaining the load bearing ability of the member.

AESTHETICALLY IMPROVED STRUCTURES



ES600 helps reduce the size of the vertical members, hence increasing the viewing area, which is particularly useful in viewing galleries.

HIGHER FLOOR SPACE AREA



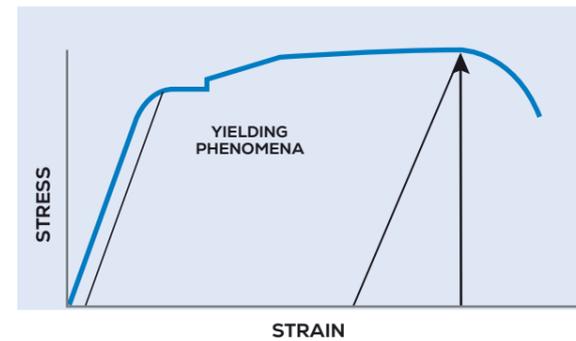
By optimizing the design of columns, the size of the columns can be reduced for the same strength thereby increasing the floor space available for sale.

I AM THE NEW BENCHMARK

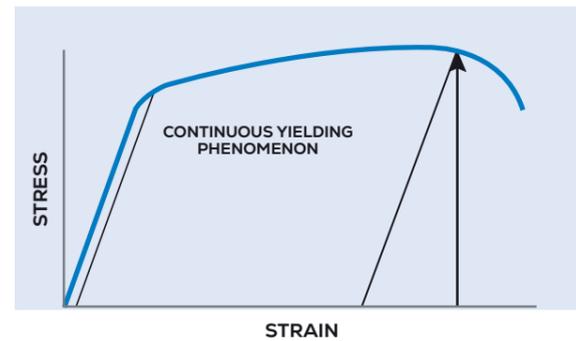
ES600 performance on mechanical properties is leaps ahead of B500B

Rebar Grade	Yield Strength (MPa Min)	Tensile Strength (MPa Min)	Elongation%	Tensile / Yield Strength Ratio
ES600*	600	690	7	1.15
B500B	500	540	5	1.08

*Based on test results



Typical BS B500B Stress strain Graph

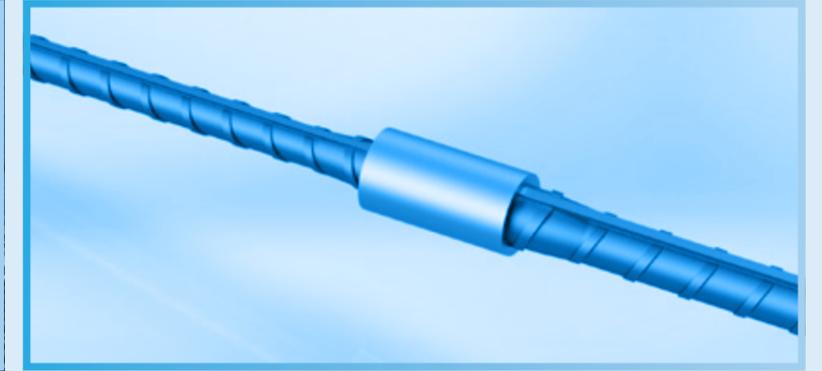


Typical BS ES600 Stress strain Graph

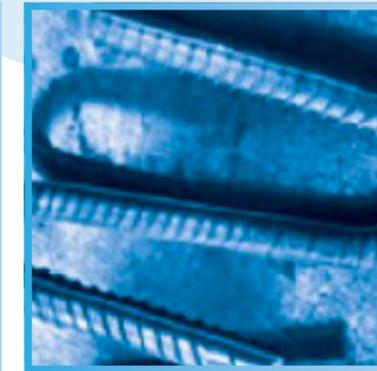
- **ES600** has a higher tensile to Yield strength ratio, indicating a higher ductility compared to **B500B**
- **ES600** performance in fatigue testing as per BS EN ISO 15630 - 1: 2010 clause 8 with test conditions as specified in BS 4449 - 2005: No failure at 5.0 x 10⁶ cycles
- **ES600** performance in Corrosion resistance - Salt Spray test results as per ASTM B117: Both **ES600** and B500B: No weight loss at the end of 500 hours



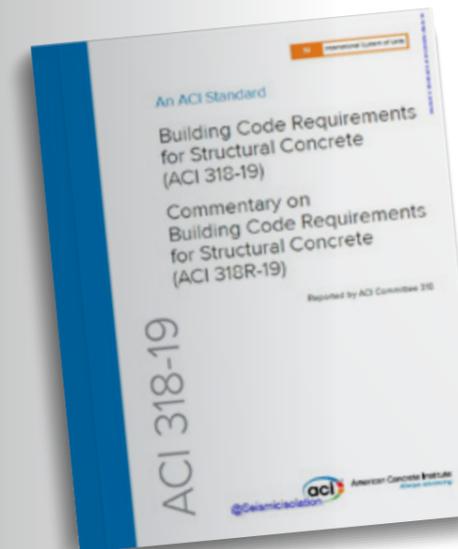
ES600 is weldable



Same couplers available in the market can be used for **ES600**, so no additional cost for couplers



ES600 performs well in complex shapes



ES600 is 100% compliant with ACI 318-19

ACCEPTANCE CRITERIA FOR GRADE 90 (600) INTERMEDIATE HIGH STRENGTH STEEL REINFORCING BARS (AC525)

TABLE 1 - BAR MECHANICAL PROPERTIES

	Grade 90 [600]
Tensile Strength, minimum, psi, [Mpa]	100,000 [690]
Yield Strength, minimum, psi, [Mpa]	90,000 [600]
Fracture Elongation in 8 in., minimum, %	7
Ratio of actual tensile strength to actual yield strength, minimum	1.1

TABLE 2 MANDREL DIAMETERS FOR THE BEND TEST AND RE-BEND TEST

Bar Nominal Diameter, mm	Grade 90 [600]	
< 16	3d	4d
> 16	3d	7d

TABLE 3- NOMINAL BAR CROSS-SECTIONAL AREA AND MASS PER METER

Bar Nominal Diameter, mm	Cross-sectional area, mm ²	Mass per Meter kg/m
8	50.3	0.395
10	78.5	0.617
12	113	0.888
13	133	1.04
16	201	1.58
20	314	2.47
22	381	2.98
25	491	3.85
28	616	4.43
32	804	6.31

TABLE 4- BAR RIB PARAMETERS

Rib height, h	Rib spacing, c	Rib inclination
0.03d to 0.15d	0.4d to 1.2d	35° to 75°

TABLE 5 - CHARACTERISTICS RELATIVE RIB AREA

Nominal Bar Size, d mm	Relative Rib Area, fr
8 < d < 12	0.04
d > 12	0.056

I HAVE BEEN EXTENSIVELY EVALUATED AND CERTIFIED



I HAVE BEEN EXTENSIVELY EVALUATED AND CERTIFIED

ICC-ES is a subsidiary of the International Code Council (ICC), the developer of the International Codes (I-Codes).

ES600 is evaluated and certified by ICC-ES, and the reports can be downloaded from www.icc-es.org

Together, ICC-ES and ICC incorporate proven techniques and practices into codes and related products and services that foster safe and sustainable design and construction.

ICC-ES has evaluated ES600 as per

- 2021 International Building Code (IBC)
- 2021 International Residential Code (IRC)
- 2013 Abu Dhabi International Building Code (ADIBC) and confirmed compliance

ES600 satisfies the requirements of and is equivalent to ASTM Grade 90 Intermediate High Strength Steel Reinforcing Bars

ACCEPTANCE CRITERIA FOR GRADE 90 [600] INTERMEDIATE HIGH-STRENGTH STEEL REINFORCING BARS AC525		
TABLE 3 NOMINAL BAR CROSS-SECTIONAL AREA AND MASS PER METER		
Bar Nominal Diameter, mm	Cross-sectional area, mm ²	Mass per Meter kg/m
8	50.3	0.395
10	78.5	0.617
12	113	0.888
13	133	1.04
16	201	1.58
20	314	2.47
22	380	2.98
25	491	3.85
28	616	4.83
32	804	6.31

For SI: 1 mm = 0.0394 in.; 1 mm² = 0.00155 in²

TABLE 2 MANDREL DIAMETERS FOR THE BEND TEST AND RE-BEND TEST		
Bar Nominal Diameter d (mm)	Maximum Mandrel Diameter For Bend Test	Maximum Bend Diameter of Re-Bend Test
	3d	4d
>16	6d	7d

TABLE 7
SPECIFIED YIELD STRENGTHS FOR DESIGN OF CONCRETE MEMBERS USING GRADE 90 (600) INTERMEDIATE HIGH-STRENGTH STEEL REINFORCING BARS

TYPE OF MEMBER	LONGITUDINAL REINFORCEMENT		TRANSVERSE REINFORCEMENT		
	Tension, psi (MPa)	Compression, psi (MPa)	Shear, psi (MPa)	Torsion, psi (MPa)	Confinement, psi (MPa)
Beams and one-way slabs	90,000 (600)	80,000 (550)	80,000 (550)	60,000 (410)	N/A
Columns	90,000 (600)	80,000 (550)	80,000 (550)	60,000 (410)	90,000 (600) ²
Tension ties	80,000 (550)	N/A	N/A	N/A	N/A
Compression struts	N/A	80,000 (550)	N/A	N/A	N/A
Two-way slabs	90,000 (600)	80,000 (550)	60,000 (410)	60,000 (410)	N/A
Walls	90,000 (600)	80,000 (550)	80,000 (550)	N/A	90,000 (600) ³
Footings and pile caps	90,000 (600)	80,000 (550)	80,000 (550)	60,000 (410)	N/A
Mat foundations	90,000 (600)	80,000 (550)	80,000 (550)	N/A	N/A

¹N/A = Not applicable, ²Spirals and ties, ³Ties

Shear Reinforcement Design Strength:

Modify ACI 318-19 Section 20.2.2.4 and Table 20.2.2.4a to read as follows: The values of f_v and f_{yt} used in design of shear reinforcement shall not exceed 60,000 psi (410 MPa), except the value may be increased to 80,000 psi (550 MPa) for beams and walls reinforced with Grade 90 [600] intermediate high-strength steel reinforcement where appearance and serviceability due to shear cracking are not critical design considerations.

Development of Deformed Bars in Tension: The modification factor, ψ_s , for Grade 100 [690] high-strength steel reinforcing bars should be used when calculating development length for Grade 90 [600] intermediate high-strength steel reinforcing bars in accordance with ACI 318-19 Table 25.4.2.

*Excerpts from AC525

I AM APPROVED BY UAE MUNICIPALITIES FOR USE IN CONSTRUCTION

ES600 rebar is approved for use in construction by



WHAT EXPERTS SAY ?



“To reduce the congestion concerns associated with confinement reinforcement, research studies show that high strength steel can be effectively used for this type of reinforcement.”

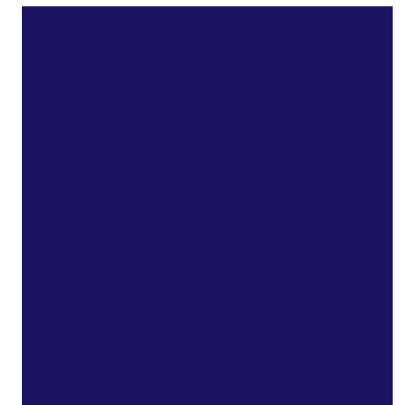
Engineer Khaled Awad

Chairman and Founder of ACTS, past president of the American Concrete Institute (ACI) and an active member of ACI, serving on Certification Programs Committee, International Advisory Committee, ACI Board Committee Chairs Committee, and the International Certification Subcommittee.

“As long as design category no higher than C, there is no problem in using ES600 of Emirates Steel for all applications using ACI 318-19”

Dr. S.K. Ghosh

S. K. Ghosh Associates LLC, Palatine, Illinois, Honorary Member of ACI, and is a Fellow of ASCE, SEI, and PCI. Member of ACI Committee 318, Standard Building Code, the ASCE 7 Standard Committee, former member of the Boards of Direction of ACI, the Earthquake Engineering Research Institute and the Building Seismic Safety Council.





حديد الإمارات أركان
emirates steel arkan



www.emiratessteel.com

