































Highway Special Construction Systems



- SUPPLY AND INSTALLATION of specialized technology materials for infrastructure
- ♦ LNK
 Post Tensioning System

owned-controlled & managed by HiSCS





- ◆ INSPECTION, NDT & EVALUATION of Structures
- ◆ MAINTENANCE & REPAIR of structural elements (specialized applications for retrofitting, maintenance, repair & upgrade)





















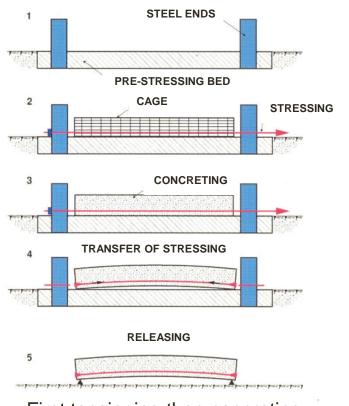






Post Tensioning System

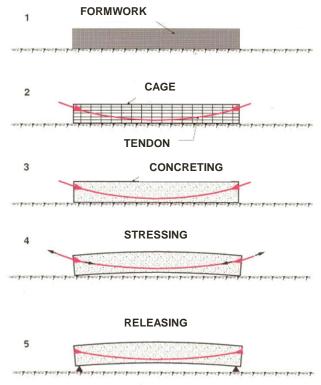
Pre & Post-tensioning Principle



First tensioning then concreting Prestressing bed







First concreting then tensioning LMK PT SYSTEM

Typically, multi-strands encased in grouted ducts. **Bonded** systems = **Grouted** systems



Advantages



Compact anchorages to facilitate the installation and grouting of the tendons.



Anchorages design to satisfy the Design requirements of Int'l Standards, European (EN – EAD -former ETAG 013) & AASHTO LRFD-10, F.I.B. (International Concrete Federation) & PTI (Post Tensioning Institute) Recommendations.



Wide selection of anchorages & jacks from 1 up to 37 strands (round) & 2 up to 5 strands (flat) allowing the Consultants to provide an economical design and specify improved technical feasibilities (proper cable deviations & losses).



37 different anchorage sizes and different types contributing to the Economy of the Design & Construction.











Anchorages

Formed with:

Cast iron units/ ASTM A48/35 - EN1561-1563

Steel anchor & coupling heads, couplers/

ASTM A29-5140 - EN-ISO-683-2/10083

Wedges/ ASTM A29-4121 - EN-ISO-683-3/10277/10084

Swages, collars & protective covers

Grouting ports & caps/

ASTM A29-1045 - EN10083, ASTM A53 - EN10255 ASTM D3841-16 - EN1796







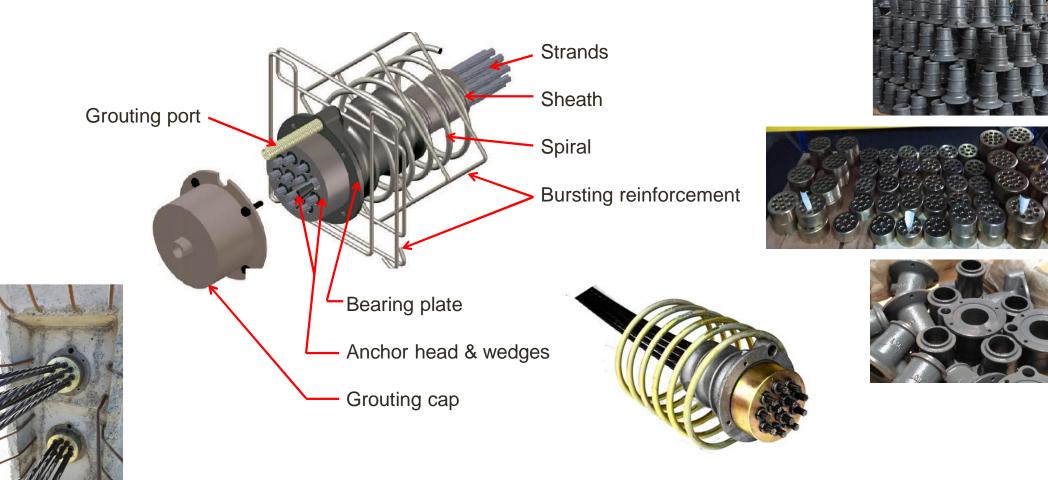






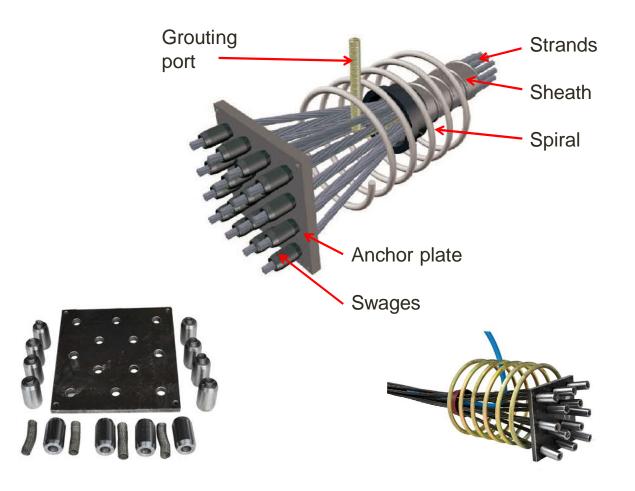
Stressing Anchorages "S"







Fixed Swaged Anchorages "FS"

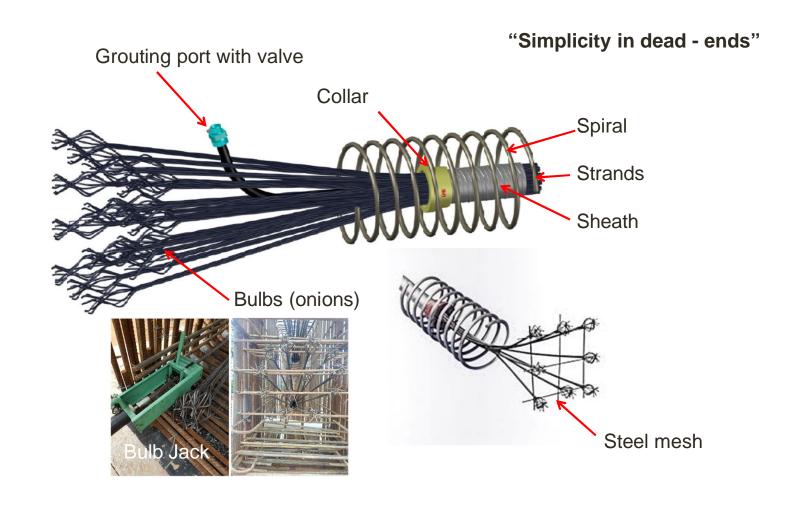


"Simplicity in dead - ends"



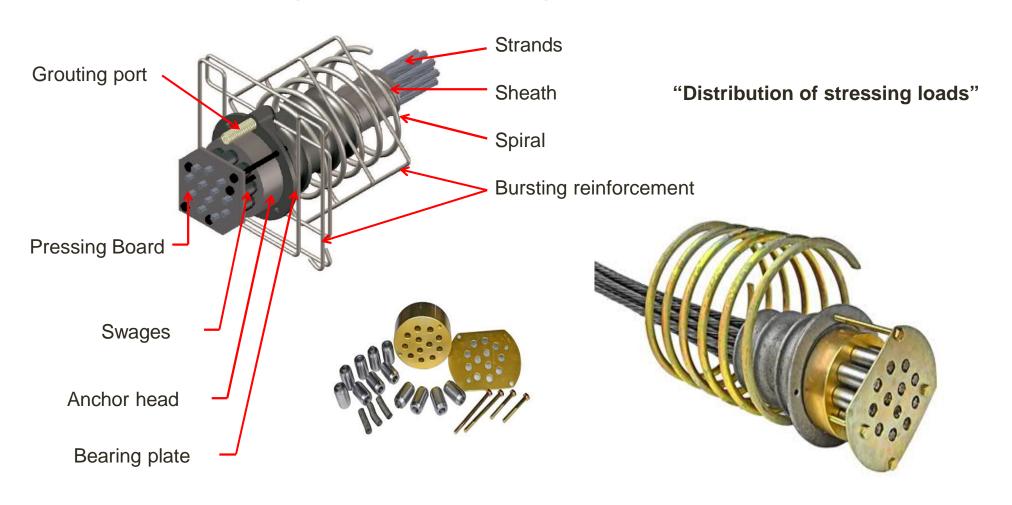


Fixed Bulb (onion) Anchorages "FB"





Fixed Swaged Anchorages "FSB"





Swaging



Spring



Extrusion



Swage



Swage Jack



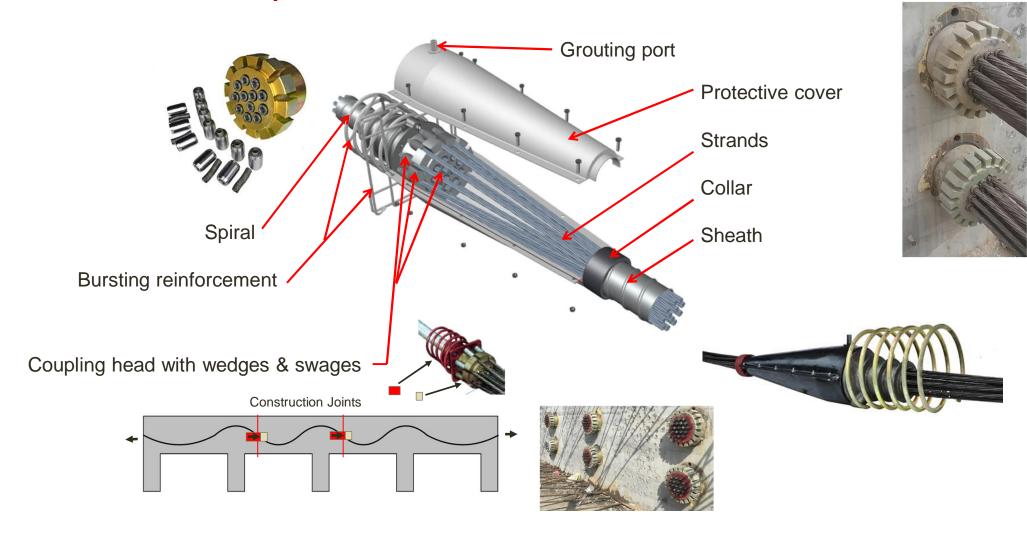
Swaging



Swaged Strand

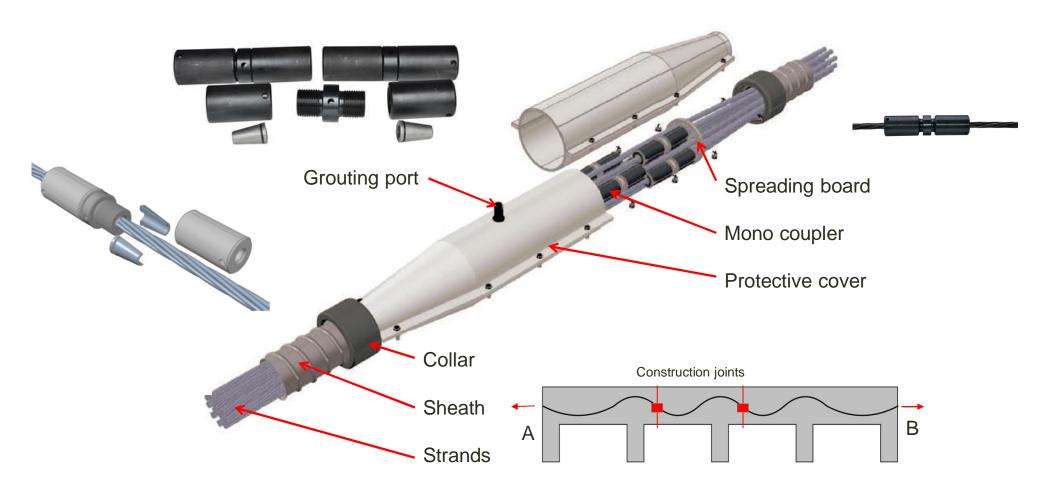
Post Tensioning System

Fixed Coupler "FC"



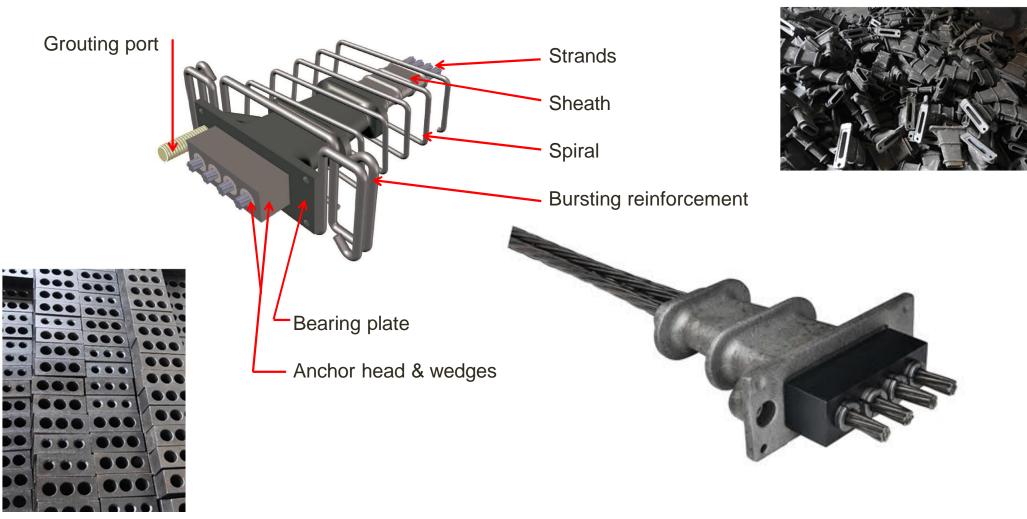


Movable Coupler "MC"

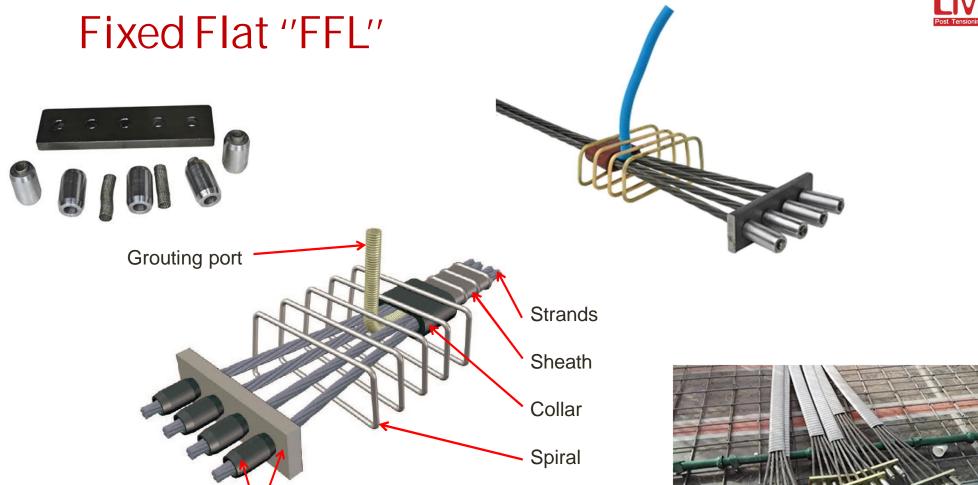


Stressing Flat "SFL"





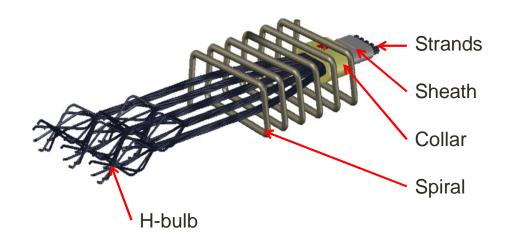




Anchor head & swages



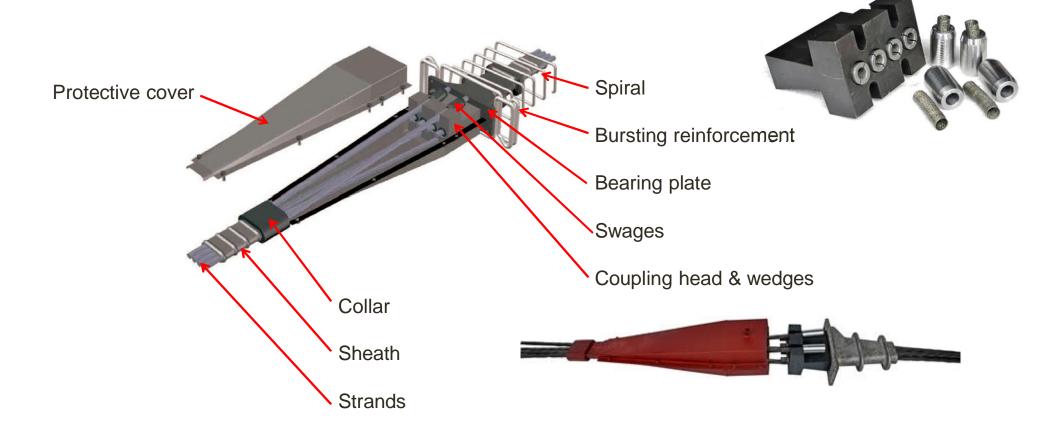
Fixed Flat "FFB"





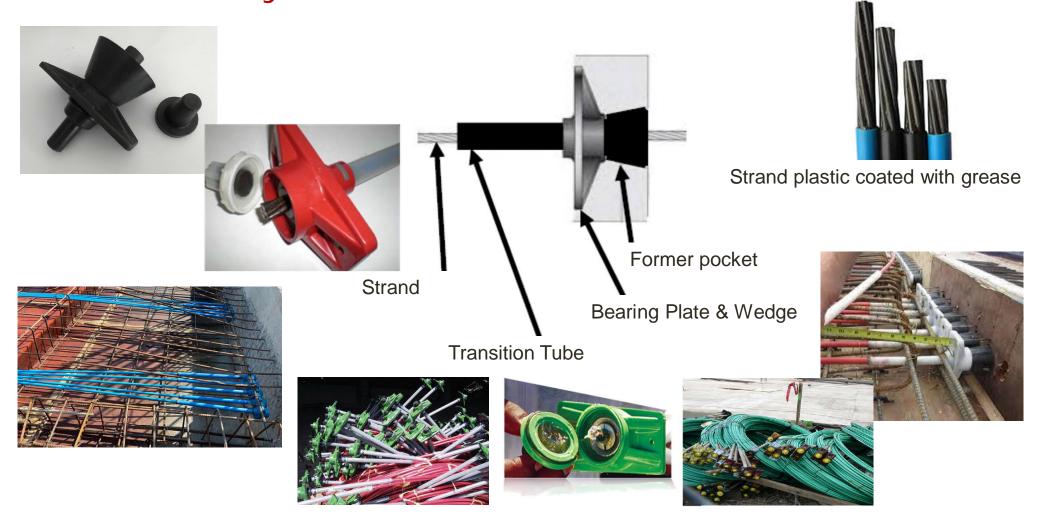


Fixed Flat Coupler "FFC"



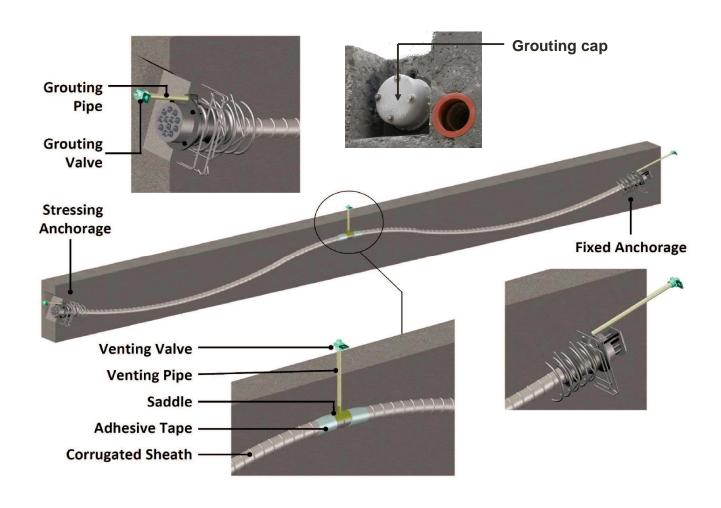
Unbonded System "U"







Tendon's Duct made of standard/galvanized steel strip, HDPE or PP



Tendon's Duct



steel/galvanized strip ducts at workshop (Φ i 45- Φ i 140) ASTM A653 - EN-10130/10346(galv), EN-523 & Fib bulletin 75



Tendon's Duct



steel/galvanized strip ducts at workshop (Φ i 45- Φ i 140) ASTM A653 - EN-10130/10346(galv), EN-523 & Fib bulletin 75



Tendon's Duct & Accessories



HDPE or PP (Φi 59- Φi 150) FIB (Federation Int'l du Beton) & PTI (Post Tensioning Insitute) ASTM D-3350-PE/4101-PP-FIB Bulletin 7 & EN-1872









Push Fit w Seal



Butt Welding



Push Fit



Heat Shrink



Segmental





Flat ducts



Tendon's Duct & Accessories



















Tendon's Duct HDPE or PP ducts





Tendon Protection Levels (FIB-Bull.7 Definitions)

PL1: A duct with a filling material providing durable corrosion protection. Duct sufficiently strong and durable for fabrication, transport, installation, concrete placement and tendon stressing, sufficiently leak tight for concrete placing and injection. (Corrugated steel duct)

PL2: Providing a permanent leak tight encapsulation for enhanced protection against corrosion and fatigue. Generally, structures in severe corrosion environment and for bridges and other structures with fatigue loadings. (Corrugated plastic duct).

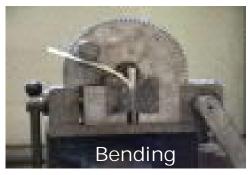
PL3: Electrically Isolated Tendons (EIT) allowing monitoring and also protection against stray currents (corrugated plastic duct and appropriate anchorage isolation).

Steel corrosion requires O_2 & H_2O and chlorides as catalyst. PE coated strand/galvanized/greased-grout cap/encapsulated, epoxy or plastic-coated anchorage, cathodic protection



Flectrical Isolation Test

Tests carried out Fib-b.7



Stahlton lab - Swiss



Stahlton lab - Swiss



Stahlton lab - Swiss



Pestec lab - Germany



Pressure

Stahlton lab - Swiss

Friction Test



Stahlton lab - Swiss



Basic Calculations LMK PT System design data



Tension at a distance (x) from the nearest stressing anchorage:

$$\sigma_{x} = \sigma_{0} e^{-\mu(\alpha + kx)}$$

Where:

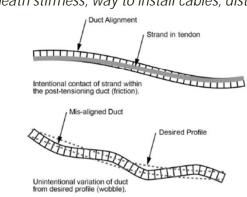
- σ_0 = tension at the anchorage
- x= cable length
- α= total angle of deviation (rad)
- μ = friction coefficient between strand and sheath (rad-1) [depends on tensioning force, bending radius, strand number, strand and sheath contact surfaces etc]

 $\Delta \chi$ = Elongation of cable

• k= coefficient of unintentional angular deviation (rad/m) [depends on sheath stiffness, way to install cables, distance between stirrups supports etc]

Recommended Values:

- Bonded strand: μ = 0,20/rad, k= 0,009 rad/m –steel ducts μ = 0,14/rad, k= 0,006 rad/m –plastic ducts
- Unbonded strand: µ= 0,06/rad, k= 0,01 rad/m

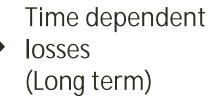


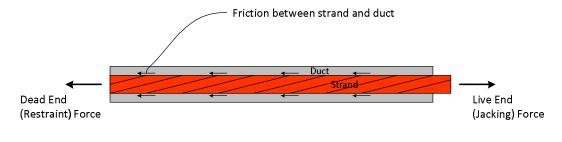
 $\Delta x = \int_{0}^{\pi} \frac{\sigma_{x}}{E} dx$



Loss of Pre-stress

- Friction
- Elastic shortening
- Anchor set
- Initial losses (Short term)
- Shrinkage
- Creep
- Relaxation





Dead End Force < Live End Force



Duct/Strand Cross-Section



Basic Calculations LMK PT System design data



Where:

- r = wedge draw in
- ℓ = tendon length where we know the tension (the cable length can be used)
- σ_{ℓ} = the tension at distance ℓ from the anchorage
- σ_i = the tension at the jack
- E = Elasticity modulus of strand
- d = the affected tendon length by the wedge draw-in
- σ_{α} = the tension of the tendon after the wedge draw-in
- σ_d = the tension of the tendon at distance d from the anchorage.

$$d = \sqrt{\frac{r \cdot E \cdot \ell}{\sigma_i - \sigma \ell}}$$

$$\sigma_{\alpha} = \sigma_{i} - \frac{2 \cdot r \cdot E}{d}$$

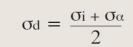
σ

 σ_{i}

 σ_d

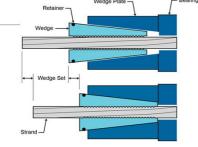
Oa

Ol



Where E ≈ 195 GPa-KN/mm²

Wedges draw-in: 4-5mm

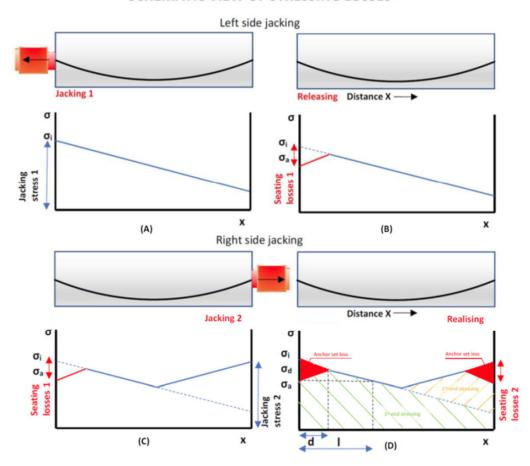


X

Basic Calculations LMK PT System design data

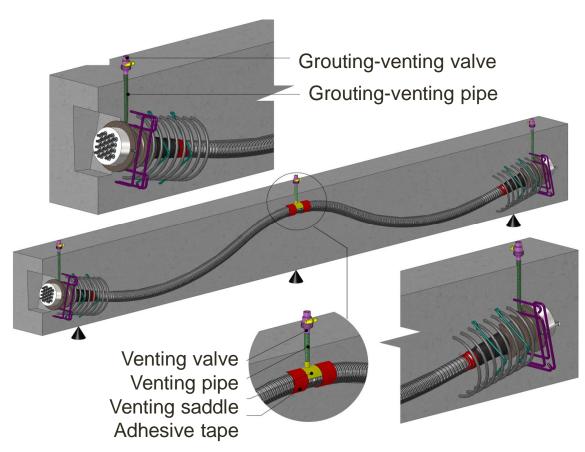


SCHEMATIC VIEW OF STRESSING LOSSES



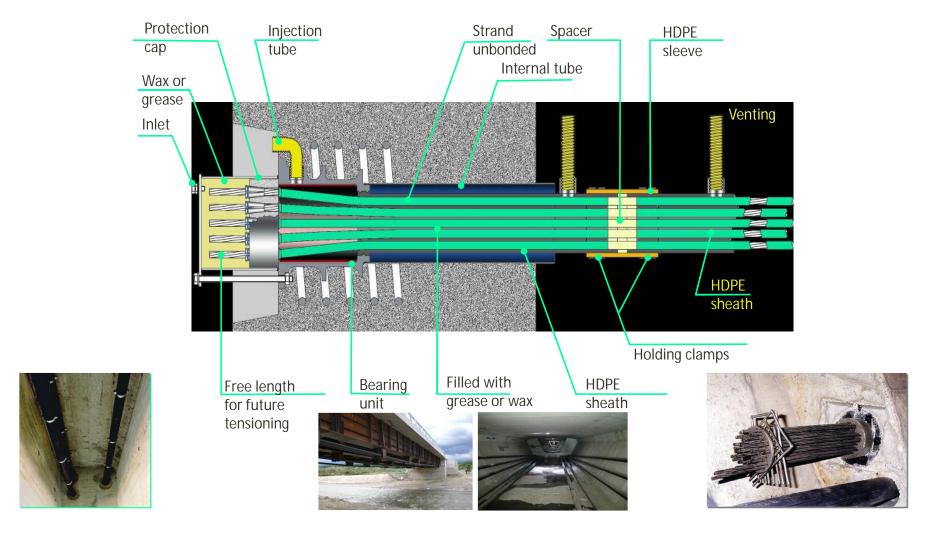


Typical layout of the cable



Internal-External Tendons Replaceable & re-tensioning solutions







Pushing & Welding Equipment

Pushing machine

Threading speed up to 120 m/min and up to 150 m









Grout-port welder



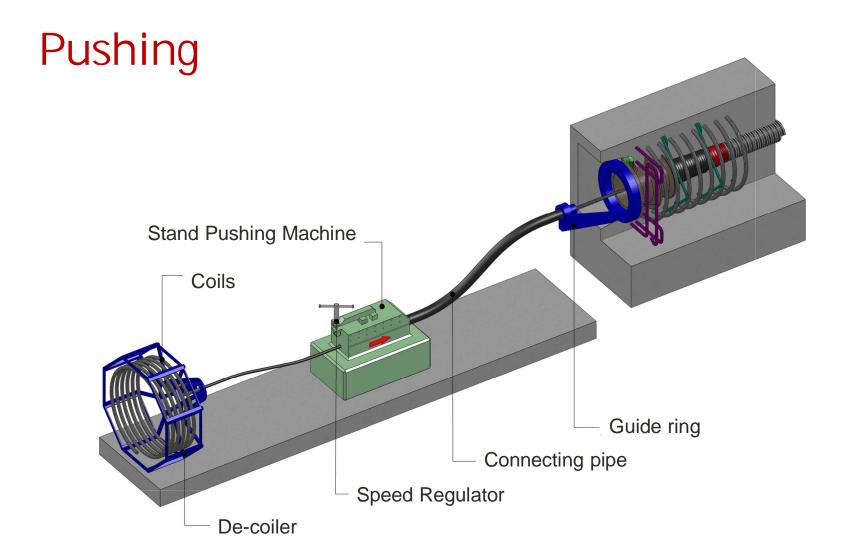
Buttwelding equipment



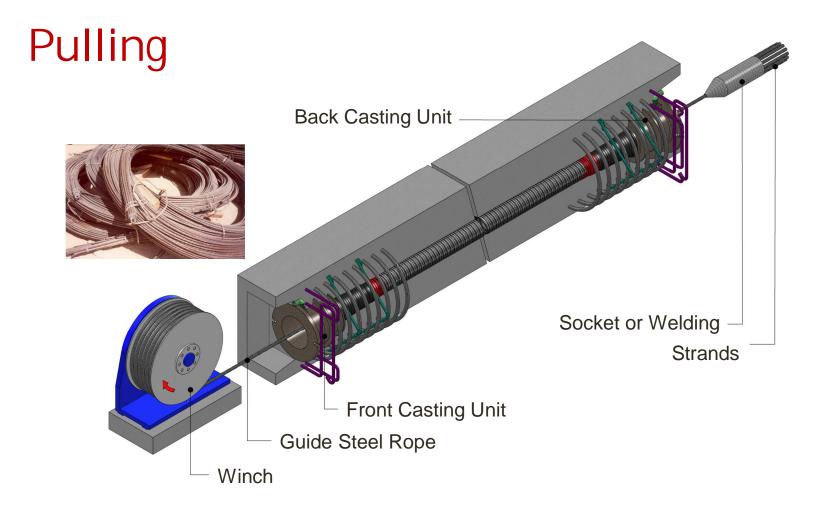
Pushing machine

De-coiler









Post Tensioning System

Stressing Jacks

- Variety of small and light stressing jacks up to 31 strands
- Front & Rear Locking-hollow type jacks up to 37 strands













Stressing Jacks

- Smaller dimensions concrete recesses
- Easier handling and simpler auxiliary equipment





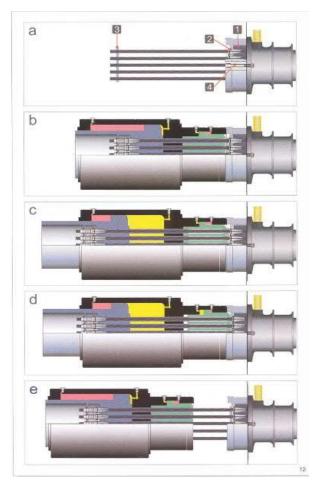
Front locking jack

Rear locking jack

Front Locking	FL Jack	up to 4M	7M	12M	15N	1 1	9M	22M	27M	31M		
	kg	55	90	145	20	00	255	320	410	470		
Rear Locking RL Jack	up to 1M	1 2M	4M	6M	8M	10IV	1 12M	14M	16M	20M	27M	37M
ka	20	40		110		165			277	300	650	980



Typical Stressing Procedure Front Locking multi-strand Jack



Positioning of stressing chair

Positioning of jack

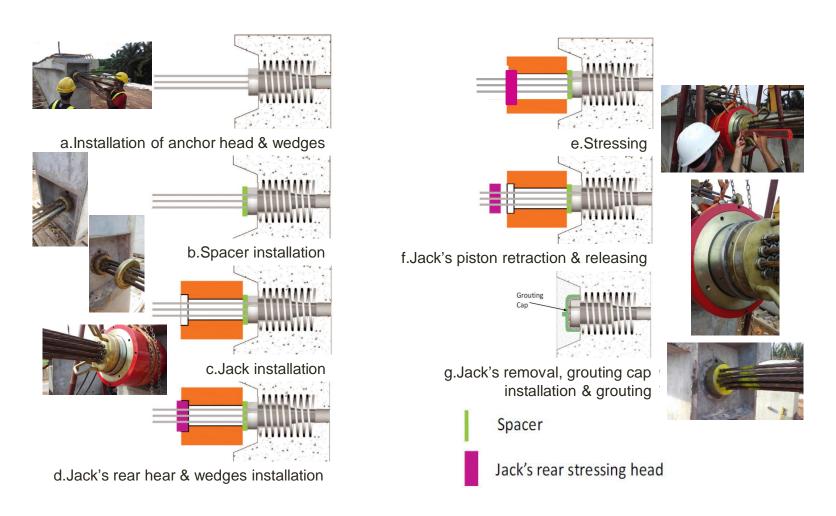
Stressing
(one or multiple phases)
Locking off wedges



Removal of jack

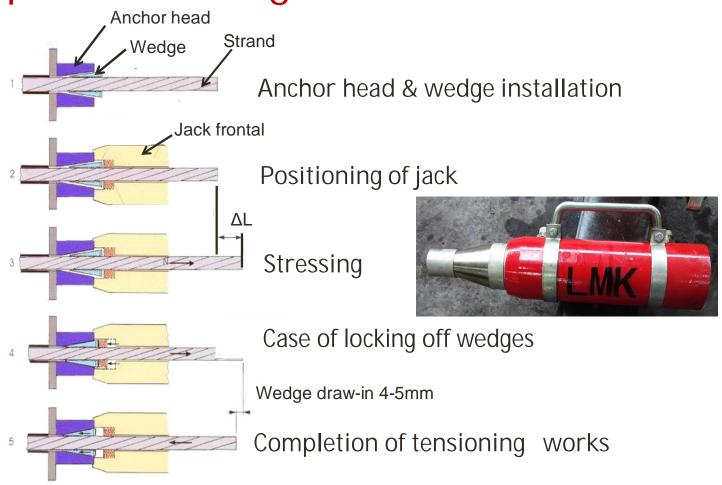


Typical Stressing Procedure Rear-Locking (Hollow) multi-strand Jack





Typical Stressing Procedure Monostrand





Stressing & Grouting Pumps

Electrical pumps, with capacity 42-120 lit.

Oil flow from 4-10 l/min at 650 bar

Easy handling

Single/double Piston pumps

• Grouting flow up to 3 m³/min

Grouting pressure 15 bar

Capacity up to 200m/50m (H/V)

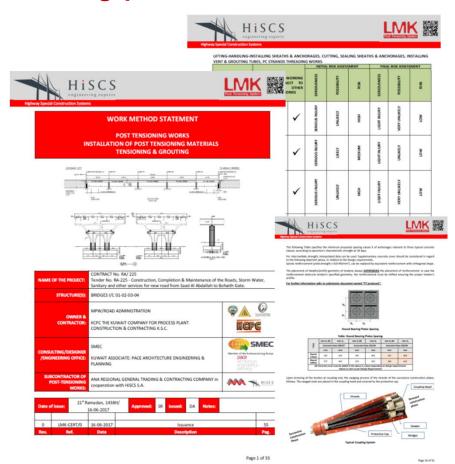
Grouting tanks up to 500 I



Post Tensioning System

LMK S

Typical WMS & other documentation



- LIST OF SUBMISSION
- WMS
- RISK ANALYSIS
- INSPECTION & TESTING SCHEDULE
- STORAGE GUIDELINES
- LMK BROCHURE
- LMK ANCHORAGE DWGS
- MILL CERTIFICATES
- PT PROTOCOLS
 - ELEVATION GEOMETRY
 - STRANDS INSTALLATION
 - STRESSING
 - GROUTING
- EQUIPMENT DATA
 - CALIBRATION CERTIFICATES
- CERTIFICATIONS & APPROVALS
- PT DFSIGN & ANALYSIS
 - SOFTWARE PRINTOUT
 - ELONGATIONS
 - PT DRAWINGS
- ANCHORAGE REINFORCEMENT





Spacer and Stressing Head with Jack Wedges Positioning using Special Lubrica

10.10.6 STRESSING JACK-TECHNICAL CHARACTERISTICS
Please refer to submission document named "LMK PT equipment"

10.10.7 STRESSING PROCEDURE

The force applied on the tendon, measured in processor (not/MPa/har), is given by the lark's calibration table

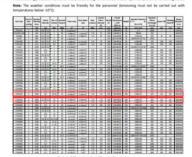
HISCS

- The jack is set to the spacer against the an
 The piston is extracted by 20 mm.
- An initial pressure of 5-10% of the final strand and anchor head alignment. This predges inside the anchor heads, to correct
- the starting point of measurements.

 The piston stroke is measured. Elongations
- At this point, as an optional way for check wedges are inserted into the anchor hear location of the strands can be marked (by



- Tensioning procedure continues until the fi obtained by the calibration table of the ja piston have to be measured. The stroke of
- Whenever the allowable stroke of the jack pressure should stop immediately. The ap is performed and re-tensioning is carried of
- release operation, the wedges are release operation, the retraction of the pis
- The procedure is completed when the design

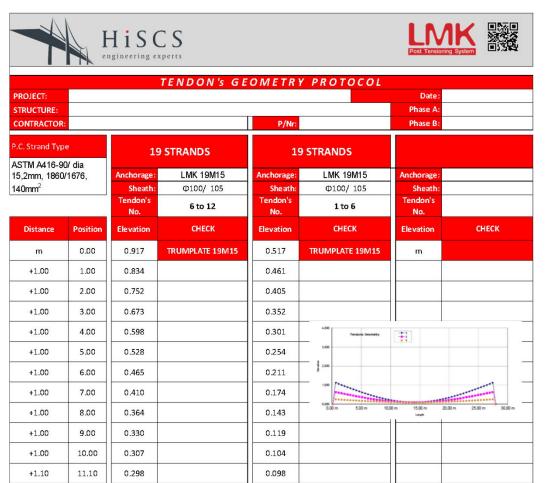


echnical Characteristics of Rear Locking Jac

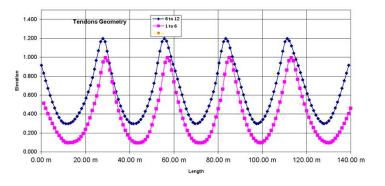


Note: Indicative maximum applied load per strand not exceeding 200 k7



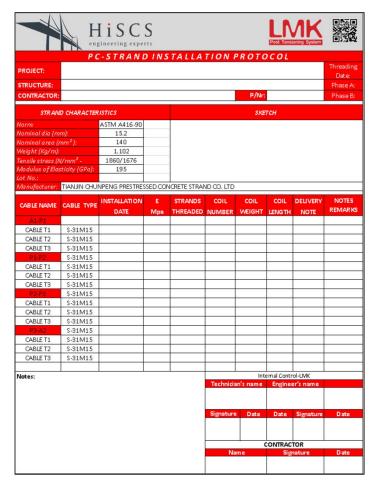














Low relaxation
7-wire strands according to Int'l standards ASTM A416 & EN10138

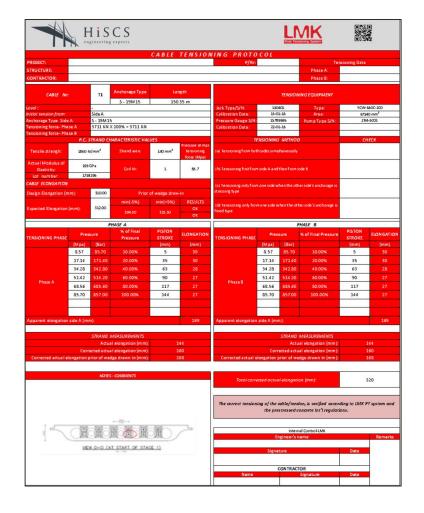


Typical Protocols















Typical Protocols



Typical Quantities per batch:

Grout mix design Water: 34~38 It

(max. 41 lt)

Admixture: 0,75 kgr Cement: 100 kgr

Grout q/ty:

Cement: 100 kgr

Water: 36 It

Grout: about 73 It



Grouting using expanding grout & water reducing/plasticizing admixtures

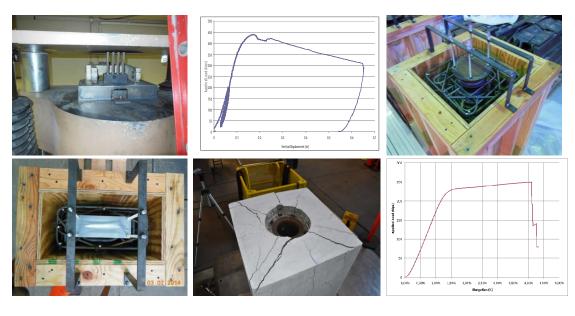
Grouting as per EN-445/446/447/ISO 14824 (test-procedures-requirements) or ASTM C939/940 (cone-bleeding)

Testing AASHTO LRFD & PTI



LEHIGH UNIVERSITY OF PENNSYLVANIA / FRITZ ENGINEERING LABORATORY - USA

- Anchorage Efficiency Test section 10.3.2 AASHTO
- Strand Wedge Connection Tests Static & Dynamic, Lubricated & non-Lubricated sections 4.1.2 & 6.1.6 / PTI Acceptance Standards for Post-Tensioning Systems
- Load Transfer Test section 10.3.2.3 AASHTO

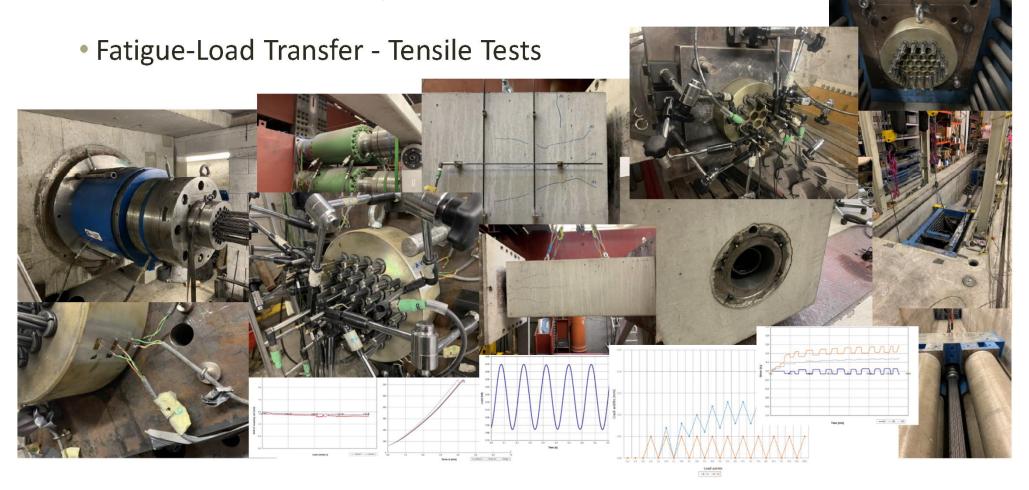




Testing EAD 160004 (former ETAG013) & EN 13391 TÜV AUSTRIATVFA-Prüf- und Forschungs GmbH



LEIPZIG INSTITUTE FOR MATERIALS, RESEARCH & TESTING-GERMANY



Testing EAD 160004 (former ETAG013) & EN 13391

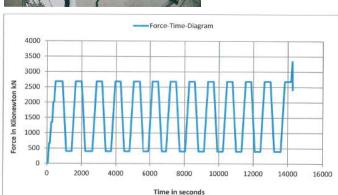
TÜV AUSTRIA TVFA – Prüf- und Forschungs GmbH LEIPZIG INSTITUTE FOR MATERIALS, RESEARCH & TESTING-GERMANY

Load Transfer Test















European **Technical Assessment**

ETA-20/0837 of 17.11.2020

Trade name of the construction product

LMK Post Tensioning System with 2 to

Österreichisches Institut für Bautechnik (OIB)

HiSCS S.A. 1, Georgiou Mpakou Street 11524 Athens Greece

Georgiou Mpakou Street
 1524 Athens

39 pages including Annexes 1 to 17, which form an integral part of this assessment.

European Assessment Document (EAD) 160004-00-0301 – Post-Tensioning Kits for Prestressing of Structures.

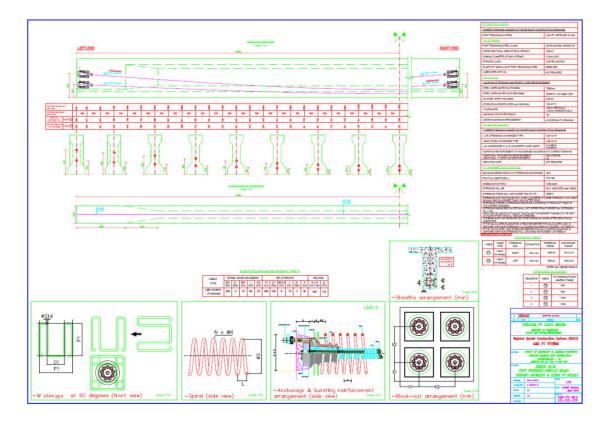
12th July 2019

Statement

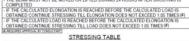
The test results are published in the TÜV AUSTRIA TVFA test reports

25917 - 006 - 008
Falique tests on LMK tendons for 7, 19 and 37 strands according to EAD 160004-00-0301

Engineering Support







BY +1-6% GROUTING OF CABLE DUCTS MUST TAKE PLACE THE SOONEST POSSIBLE IN THE NEXT 24 HOURS AFTER 100% ALL TENDONS STRESSED THE BEAM MUST NOT BE MOVED OR LIFTED DURING 24 HOURS AFTER GROUTING IS

CABLE	CABLE TYPE	STRESSING END	ELONGATION	STRESSING FORCE	ANCHORAGE FORCE*
(T)	10M15 (10 strands)	RIGHT	163.4 mm	1955 kN	1814.2 kN
12	10M15 (10 strands)	LEFT	162.6 mm	1965 NN	1804.5 kN

* AFTER 4mm WEDGE DRAW-IN

STRESSING SEQUENSE				
e as gn				
П				



Technical Support



- Preliminary & Final Design
- Bursting Reinforcement, Geometry & Elongations
- Supply of PT materials (strands, anchorages, sheaths, ancillaries)
- Supply/Renting of equipment (jacks, pumps, grouting & threading machines, de-coilers, pressure gauges etc)

POST TENSIONING SYSTEM

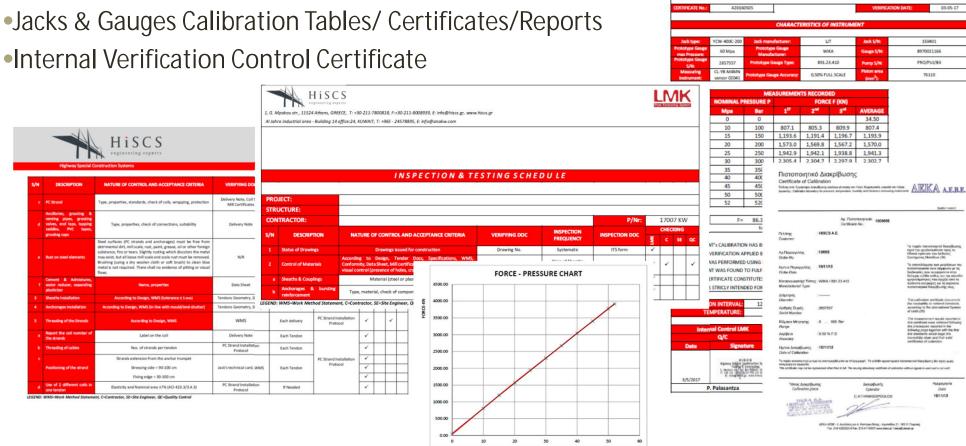
- Installation-planning-supervision-training
- Tensioning
- Grouting/testing
- Any other technical support related with PT bridge technology

HISCS

LMK

Quality of Services

- Inspection & Testing Schedule

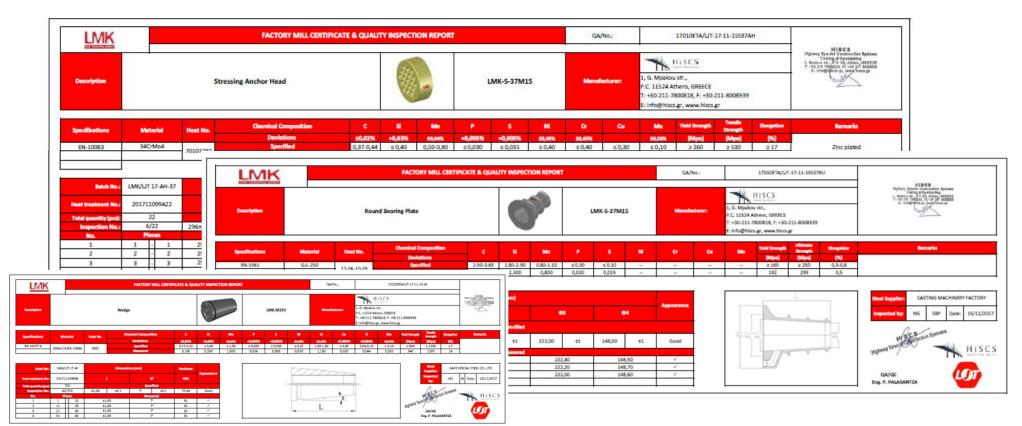






Quality of Services

Factory Quality Inspection Reports



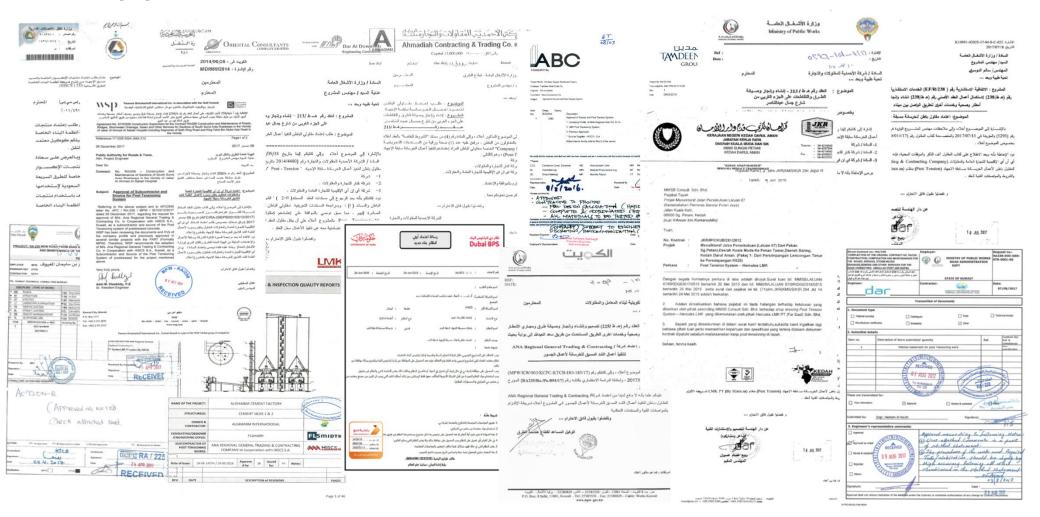


Post Tensioning Institute-PTI





Approvals Kingdom of Saudi Arabia – Kuwait – UAE - Malaysia



Recommendations









LETTER OF RECOMMENDATION TO

M/S ANA REGIONAL TRADING & CONTRACTING CO

NASA Construction Co., like to attest and express the satisfaction to System, a professional and consistent supplier & installer in the field of such as PT anchorages, PC strands, ancillaries and equipment.

The materials installed are of quality and durability fulfilling all needs a Specifications.

Your excellent business standards and evident ethic dealings compel u_i prospective and potential clients with no hesitation.

We highly recommend ANA Company (LMK PT System) for future pr



فطعه ب - فسيمة ٢١ - صرب: ٢١١١٠ - الشويح العنتاعية - الرمز الدرندو ٢٠٠١ - الكويت | Industrial Area - Zone No. 3 - Block B - Plot 16 - P. O. Box 42166 - Shuwsiki Industrial



to attest and IBRA materials such equipment.

ANA-HISCS-



IBRA HS SDN. BHD. Recom

Letter of appreciation & recommendation to M/S. HERCULES LMK PT (FAR EAST) SON BHD

IBRA HS SDN. BHD. like to attest and express the satisfaction to work with HERCULES LMK, a professional and consistent supplier in the field of bridge Post Tensioning materials such as PT anchorages, ancillaries and PT equipment.

HERCULES LMK's customer care program and quality protocols suppc exceptional Technical & Commercial Services provided an effective solution to accomplish demanding project such as bridges in Projek Jalan Persekutuan (Laluan 67) Dari Pekan Sungai Petani, Daerah Ku Pekan Tawar Daerah Baling, Kedah Darul Aman. (Pakej 1 – Dari Pe Lencongan Timur Ke Persimpangan K620).

The materials installed are of quality and durability fulfilling all requirements of Designs & Specifications.

Your excellent business standards and evident ethic dealings compe you to all your prospective and potential clients with no hesitation.

We highly recommend Hercules LMK PT (Far East) Sdn Bhd for futur The materials installed fulfilled the needs and requirements of Design any Client searching for bridge Post Tensioning applications, m

IBRA HS SDN. BHD. (494612-K)

ZULKEFLI BIN ABDUL KHADIR **Project Directo**

No.152, First Floor, Kompleks Alor Setar, Lebuhraya Daral Aman, 05100 Alor Setar, Kedah D. No. Tek. 1604-730 9006 No. Faks 1604-730 9236 E. della United State State Setar Set



RECOMMENDATION LETTER

M/S HISCS-LMK

ERGO WLL would like to attest and express the satisfaction to we Member of Found Alphanim & Sons Group of Compani system, a professional and consistent supplier in the field of bridge PT anchorages, ancillaries and PT equipment.

HiSCS-LMK's supervision and training program supported by their e and Commercial Services provided an effective and prompt solution in the bridges in Sheikh Jaber Al-Ahmad Al-Sabah Causeway Project

The PT stressing equipment supplied are of quality and durability fu of specification of project.

Project Name: Contract No . RA225 Design Conctruction Completion& Maintenance OF The Roads, Storm Water Sanitary And Other Services For New ROAD From Saad Al Abdallah To Bohaith Gate

Letter Of Appreciation & Recommendation

To Whom It May Concern

This is to confirm that ANA-HISCS-LMK had successfully executed the Post Tensioning System works at the RA225 Project .

M/s ANA-HISCS-LMK proven their expertise by fulfilling all Documentation, Technical, Procurement, Quality and Close out requirements.

We shall definitely Consider M/s ANA-HISCS-LMK in our Future PT works, and higly recommend M/s ANA-HISCS-LMK to any Company searching for bridge PT applications, materials and

Best Regards,

Project Manager



حبدي شركبان مجموعية فؤاد الفائب ولولاء

شركة الغانم انترناشيونال للتجارة العامة والمقاولات ذ. م. م

Alghanim International General Trading & Contracting Co. W.L.L.

Letter of appreciation & recommendation to

M/S ANA-HISCS-LMK

ALGHANIM INTERNATIONAL GENERAL TRADING AND CONT. CO. W.L.L., like to attest and express the satisfaction to work with ANA-HiSCS-LMK, a professional and consistent supplier in the field of bridge Post Tensioning materials such as PT anchorages, ancillaries and PT equipment.

ANA-HISCS-LMK's customer care program and quality protocols supported by their exceptional Technical & Commercial Services provided an effective and prompt solution to accomplish demanding projects such as RA/238- Construction, Completion

& Maintenance of Roads, Bridges and Rain Water and Sanitary Lines and Other Services for the Road Retween Mina Abdullah City & Wafra

The materials installed are of quality and durability fulfilling all needs and requirements of specification of Designs & Specifications.

Your excellent business standard and evident ethic dealings compel us to refer you to all your prospective and potential clients with no hesitation.

We highly recommend ANA-HISCS-LMK Company for future projects to any Client searching for bridge PT applications, material and Engineering.



3 9001:2015 0 14001:2015 OHSHA 18001:2017
 GgB 174-73-34eb 1714 report 1711-144 / 1711-141 replies 1711-144 replies (specify) replies

 TEATHY / TEATHY

M. BINLDIN Co. Recommendation Letter

Letter of appreciation & recommendation to

M/s. HISCS-LMK

M. BINLADIN Co. like to attest and express their satisfaction for work with H

LMK, for supply and services for Post Tensioning materials such as PT anchor

HiSCS-LMK's customer care program and quality protocols supported by

exceptional Technical & Commercial Services provided an effective and pro-

solution to accomplish demanding project such as bridges in Jeddah-Makkah

We have no hesitation to recommend them to others with similar wo

requiring Post-tensioning material, back-up support and Engineering.

ancillaries and PT equipment.

Specifications.

Personnel Training



AUTHORIZATION CERTIFICATE

HiSCS PT Specialist Company and LMK PT system Owner, herewith certifies that:

Eng. Ahmad Khalil Al Hawi

is authorized and has been trained to install LMK Post-tensioning system materials for bridges, buildings & structures such as anchorages & hardware (all types of round and flat bearing plates, active & passive anchor heads and coupling systems), sheaths (plastic and steel), PC strands, ancillary materials (grouting & venting tubes, tapping saddles, sheath coupling systems, grouting caps, grouting ports and valves etc), grouting materials & admixtures and any other PT material related with LMK PT system.

Is furthermore qualified and entitled for the independent execution of post-tensioning works for the proper application of LMK PT, including supervision, inspection, stressing/releasing and grouting/testing of tendons and handle as well requirements of any PT Projects concerning the above mentioned systems & materials under the license and specifications of LMK PT system, as a PT specialist in the territory of:

STATE of KUWAIT

The certification is valid until 31st October 2017.



LMK PT specialist personnel passed successfully qualification and auditing of HBSCS and is continuously trained in the field of LMK PT technology being qualified for PT works in the above mentioned territory. The Holdier of this certificate is responsible for compliance with MR PT Work Method Statement as well as with the applicable specifications, guidelines and standards where in use ensuring a prompt and safe accomplishment of the post-tensioning works.

Certification No.: 2016/09/29-ANA



1, G. Mpakou str., 11524 Athens, GREECE, T: +30-211-7800818, F:+30-211-8008939, E: info@hiscs.gr, www.hiscs.gr





AUTHORIZATION CERTIFICATE

HiSCS PT Specialist Company and LMK PT system Owner, herewith certifies that:

Eng. Mohammad Salam Mohammad Ali Mobasher

Is authorized and has been trained to install LMK Post-tensioning system materials for bridges, buildings & structures such as anchorages & hardware (all types of round and flat bearing plates, active & passive anchor heads and coupling systems), sheaths (plastic and steel), PC strands, ancillary materials (grouting & venting tubes, tapping saddles, sheath coupling systems, grouting caps, grouting ports and valves etc), grouting materials & admixtures and any other PT material related with LMK PT system.

Is furthermore qualified and entitled for the independent execution of post-tensioning works for the proper application of LMK PT, including supervision, inspection, stressing/releasing and grouting/testing of tendons and handle as well requirements of any PT Projects concerning the above mentioned systems & materials under the license and specifications of LMK PT system, as a PT Specialist in the territory of:

STATE of KUWAIT

The certification is valid until 31st October 2017.



LMK PT Specialist personnel passed successfully qualification and auditing of HISCS and is continuously trained in the field of LMK PT technology being qualified for PT works in the above mentioned territory. The Holder of this certificate is responsible for compliance with LMK PT Work Method Statement as well as with the applicable specifications, guidelines and standards where in use ensuring a prompt and safe accomplishment of the post retaining works.

Certification No.: 2016/09/28-ANA

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Building, Bridge Road & R/W Applications





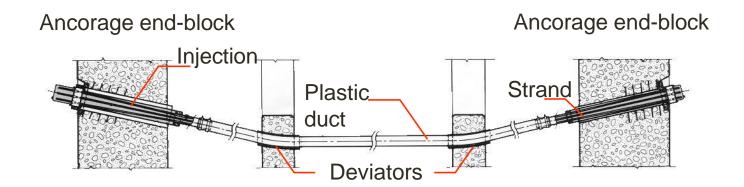


Pre-casted Beams
Balanced Cantilever
Incremental Launching
Form Traveller







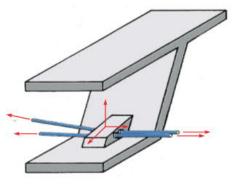


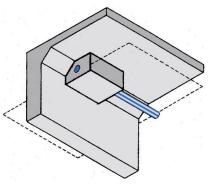


Basic configuration for simply supported beams



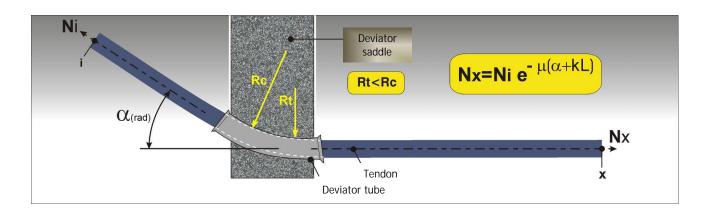






Basic configuration for segmental structures





Basic parameters of design

K = wooble coefficient

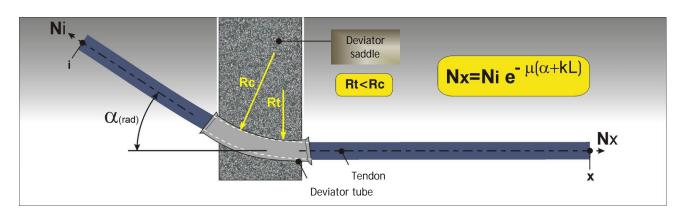
M = friction coefficient

K = 0

Typical values of \boldsymbol{M}

Strand	Duct	Coeff. M
Lubricated	HDPE	0.12 /rad
Non lubricated	HDPE	0.14 /rad
Lubricated	Steel	0.18 /rad
Non lubricated	Steel	0.25 /rad





Basic configuration for deviators

Strand type	Radius min. near anchorage Rc [m]	Radius min. at deviator Rc [m]
12M15	3.5	2.5
19M15	4.0	3.0
37M15	5.0	5.0



Tendons grouted with cement

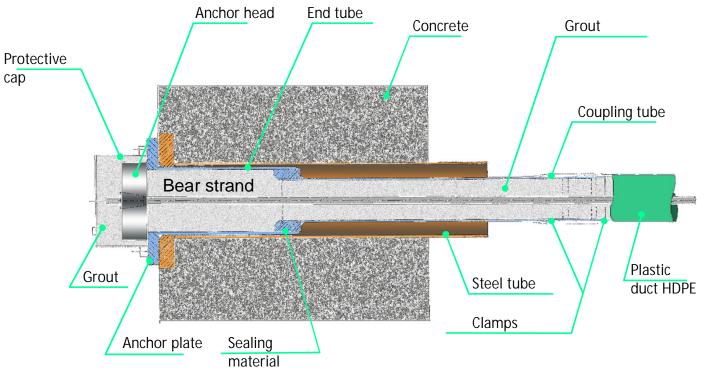
- Duct Area ≥ 2 Strand Cross Section
- $P_{nominal} \ge 1 \text{ MPa (10 bar)}$

Duct	Thickness	
Steel	S 3 Ø/50	S ³ 1.5 mm S ³ 3 mm when welded
HDPE (*)	S 3 Ø/16	S ³ 5 mm (*) UV resistance

Basic configuration for ducts

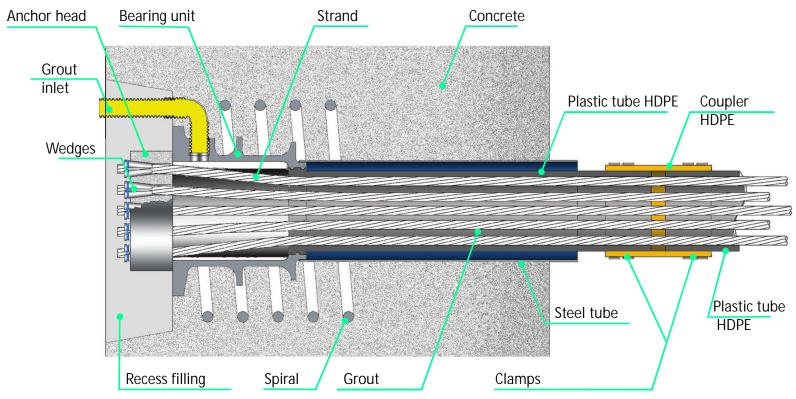


External PT configuration without need of restressing



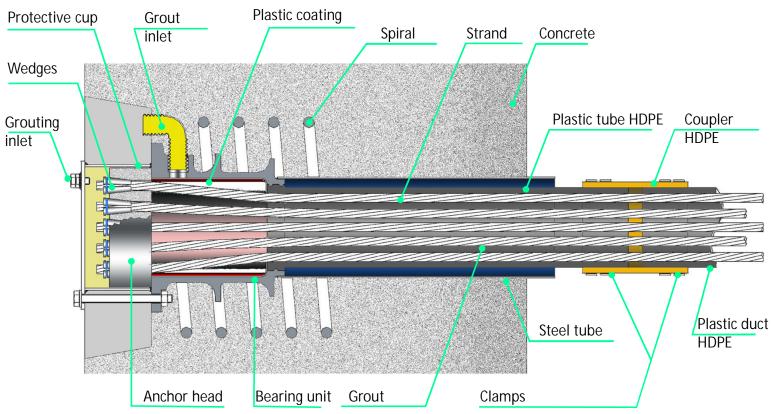


External PT configuration without need of replacement



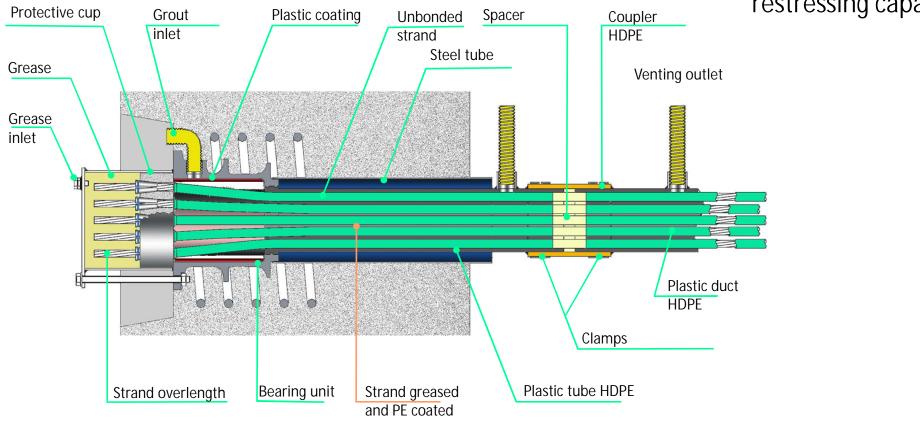


External PT configuration without need of replacement



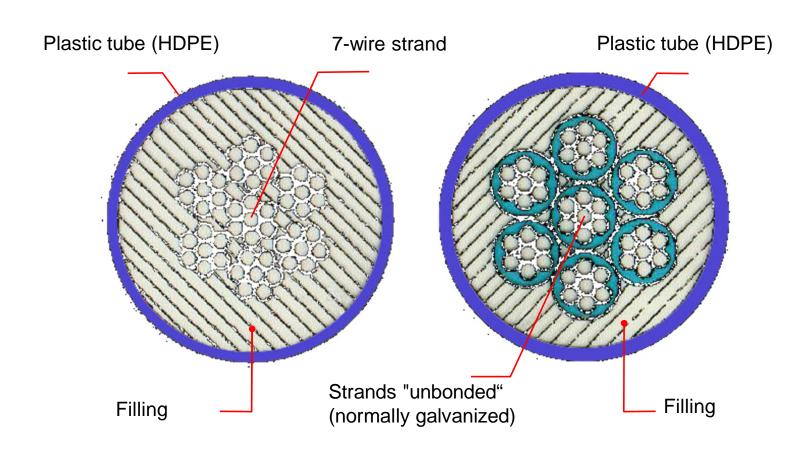


External PT configuration with restressing capacity





External PT Protection

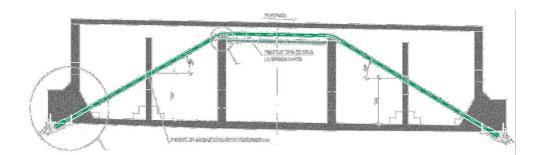




External PT Protection

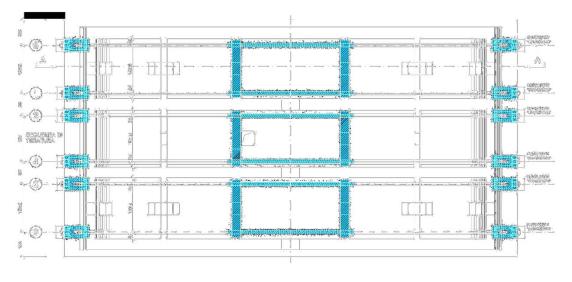
Exposure		Internal PT		External PT
11/2	Anticorrosion protection	ConcreteSheathGrout	Individual strands (Unbonded)	GalvanizedWax or GreasePlastic duct HDPE
			Group of strands	 Plastic duct HDPE or galvanizes/stainless steel tube Grout or wax/grease
and the second	Fire protection	ConcreteSheathGrout	Necessary	
	Vandalism protection	ConcreteSheathGrout	Necessary	



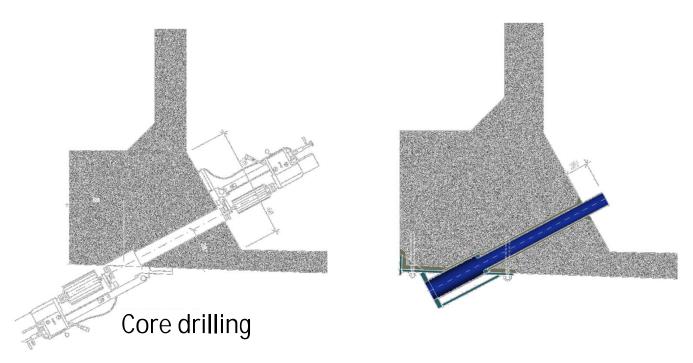


Typical case of upgrading a structure to bear additional traffic loads

By utilizing external PT an additional compressive load is implemented into the structural elements







Drilling for placement of inner plastic duct and placement of steel anchoring system

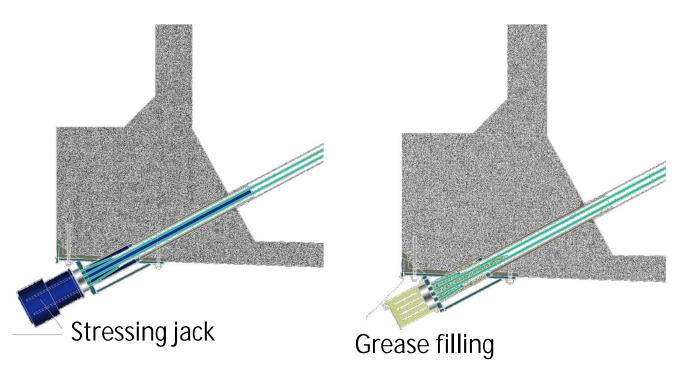






Placement of steel tube and anchoring plate









PT Erection Applications











PT Erection Applications





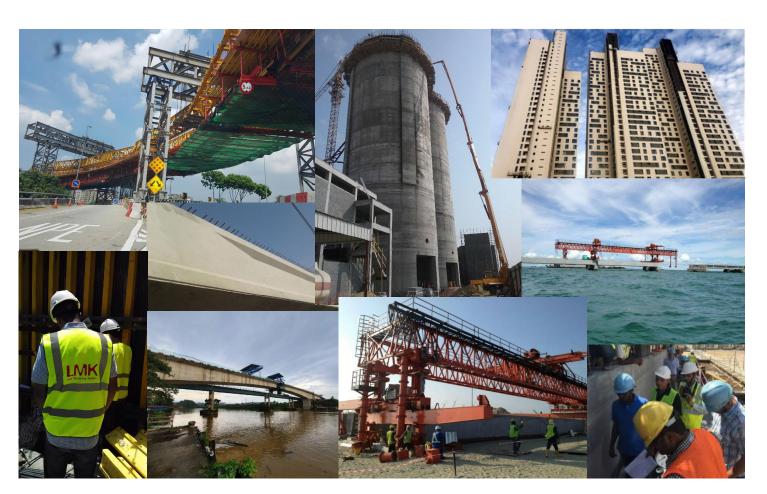






PT Solutions





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Systems

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