KPO TECHNICAL WEBINAR ON LINEPIPES&PIPING AND INSULATION MATERIALS WITH THE PARTICIPATION OF THE IMB CENTER

KARACHAGANAK PETROLEUM OPERATING B.V

23/09/2024

DISCLAIMER

The information contained in these slides is made available for consideration. It represents KPO's preliminary description of the KPO demands as presently envisaged, but KPO reserves the right to change this information in the course of planning and implementing the projects, and KPO cannot be held responsible for any loss, damage or expense arising from reliance on this information. The information will not form part of any agreement between KPO and business partners participating in the workshop.
Today's engagement is one of many steps which KPO and its stakeholders are taking to develop local content.

LINE PIPE / Piping – **AGENDA**

A: Piping
1. Overview
2. Piping Materials & Testing Req.
3. Specification overview
4. Piping Frequently Used and Forecast

B: Line Pipe
1. Overview
2. Type of Line Pipe
3. Line Pipe Specification
4. Line Pipe Datasheet

C: Line Pipe External Coating
1. Overview
2. Type of Line Pipe Coating
3. Coating specification requirements

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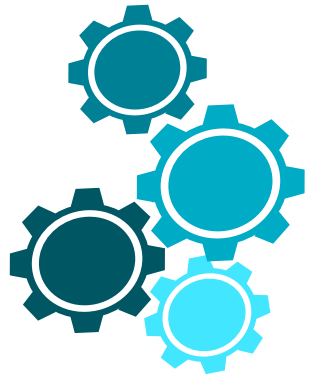

Project Execution Directorate Engineering and Technical Authority Department

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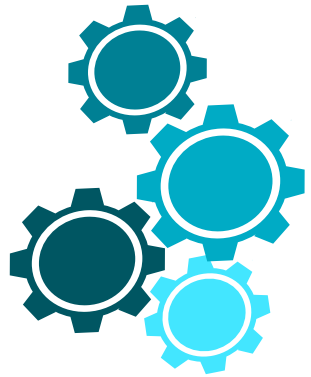
Section A

Piping



1 Overview

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Piping Overview

Objective:

The goal of this presentation is to provide a clear understanding of the piping materials used in KPO for both sour and non-sour services, and how they comply with ASME standards. We will explore historical development, material requirements, restrictions, and international specifications.

Importance:

KPO operates in a demanding environment where piping systems are subjected to extreme conditions. Compliance with ASME standards is necessary to ensure safety, integrity, and longevity of piping systems.

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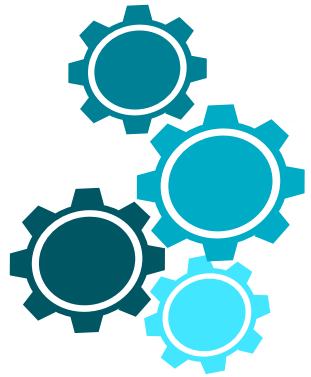
Section A

Piping



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Piping Materials & Testing Req.

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Piping Material and Testing requirement

Sour Service Materials:

For sour service, we use materials that comply with NACE MR0175/ISO 15156 standards to prevent sulphide stress cracking.
Common materials include high-performance alloys (e.g., Inconel 625 / 825) and carbon steels with controlled hardness (e.g. A333 gr.6)

Material Selection Factors:

Corrosion resistance, temperature, and pressure ratings.
Resistance to sulphide stress cracking (SSC) in sour service.

Construction type:

Seamless Pipe (**SMLS**):

Manufactured without a seam or a weld, produced by extruding a solid steel billet through a piercing rod to create a hollow tube.

Electric Fusion Welded Pipe (**EFW**):

Produced by rolling plate and then joining the edges by electric fusion welding. Includes subcategories such as Double Submerged Arc Welded (DSAW) and High-Frequency Welded (HFW).

Electric Resistance Welded Pipe (**ERW**):

Manufactured by rolling a metal plate or strip and welding the seam with electric resistance heating. ERW pipes are commonly used in lower-pressure systems.

Piping Material and Testing requirement

Material	Code Reference	Test Required (By Manufacturer)	Remarks (Service/MAWP)
Low-Temperature Carbon Steel (A333 Gr. 6)	ASME B31.3, ASME B16.5, NACE MR0175	Tensile Test, Charpy Impact Test (-45°C), Hardness Test (By Manufacturer)	Sour and non-sour service, suitable for low-temperature applications (down to -45°C). MAWP typically up to 1440 psi.
Carbon Steel (A671 CC 60)	ASME B31.3, ASME B16.5, NACE MR0175	Ultrasonic Test, Tensile Test, Charpy Impact Test (-45°C) (By Manufacturer)	Sour and non-sour service, primarily for welded pressure piping. MAWP varies with wall thickness, typically up to 1500 psi.
Stainless Steel 304/304L (A312/A358 TP304/304L)	ASME B31.3, ASME B16.5, NACE MR0175	PMI, Intergranular Corrosion Test, Tensile Test (By Manufacturer)	Non-sour service, good general corrosion resistance. MAWP typically up to 1000 psi, depending on schedule and size.
Stainless Steel 316/316L (A312/A358 TP316/316L)	ASME B31.3, ASME B16.5, NACE MR0175	PMI, Intergranular Corrosion Test, Tensile Test (By Manufacturer)	Sour and non-sour service, excellent resistance to chloride and acidic environments. MAWP up to 1000 psi for general use.
Inconel 625 (B444)	ASME B31.3, NACE MR0175	Tensile Test, Corrosion Resistance Test (By Manufacturer)	Sour service, high resistance to H2S, chloride stress, and pitting corrosion. MAWP can exceed 5000 psi in critical services.
Incoloy 825 (B423)	ASME B31.3, NACE MR0175	Corrosion Resistance Test, Tensile Test (By Manufacturer)	Sour service, highly resistant to sulfuric and phosphoric acids. MAWP typically up to 4000 psi in high-pressure systems.
Alloy 20 (B729-N08020)	ASME B31.3, NACE MR0175	Intergranular Corrosion Test, Tensile Test (By Manufacturer)	Sour and non-sour service, excellent resistance to sulfuric acid corrosion. MAWP up to 2000 psi depending on size and thickness.
Titanium Gr. 2 (B337)	ASME B31.3, NACE MR0175	Tensile Test, Corrosion Resistance Test (By Manufacturer)	Sour service, extreme corrosion resistance in oxidizing environments. MAWP typically up to 1500 psi.
ASTM A182/A336 F22 Modified	ASME B31.3 chapter IX, NACE MR0175 KPO-80-PIP-SPC-00004-E *Custom Made for KPO	KPO-80-PIP-SPC-00004-E	Material it is designed for high pressure, 605 bar, sour service with ambient temperature as low as -45°C

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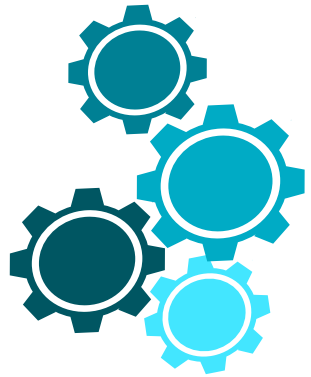
Section A

Piping



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Specification Overview

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Company specification to comply

Size and Schedule:

Piping size is governed by nominal pipe size (NPS), which refers to the outside diameter, while the schedule indicates wall thickness.
Common pipe sizes range from NPS ½" to NPS 48", with schedules ranging from 10 to XXS.
Custom schedule for specific project for Sour Service: Higher schedules (thicker walls) are used to withstand the more aggressive environment, especially in higher pressure ratings.

Temperature and Pressure Limits:

ASME codes specify temperature and pressure limits for materials. For example, carbon steel can be used at temperatures up to 427°C (800°F) for non-sour service but has limitations in sour environments.
Flange Ratings (ASME B16.5): Define pressure-temperature limits for different materials and flange types.

S/N	Document Number	Title	Rev.
1	KPO-00-PIP-SPC-00005-ER	Technical Supply Requirements Pipe, Fittings and Flanges	C8
2	KPO-00-PIP-SPC-00008-E	Specification for Piping, Forgings, Castings and Plate for Sour Service	C5
3	KPO-80-PIP-SPC-00004-E	Company Specification. High Pressure Piping Materials Specification for 2 1/4 Cr-1 Mo. (F22 M)	A4
4	KPO-00-ENG-SPC-00017-ER	Positive Materials Identification	A3
5	KPO-00-PIP-SPC-00022-E	Colour Coding for Piping Components	A1

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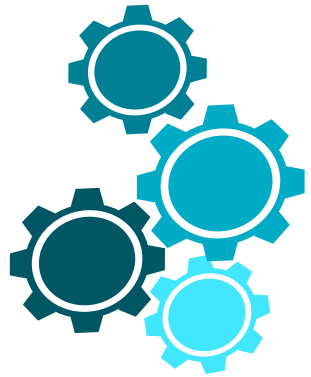

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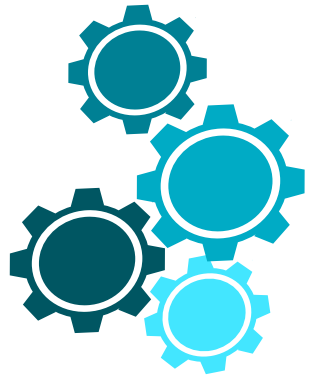
LINEPIPE

Part 2



1 Overview

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Overview

KPO specifications are significantly more complex than standard industry requirements, primarily due to the. challenging fluid conditions (high H2S content) and extreme temperatures encountered

- **Historical Development**: Over the past 20 years, KPO b.v. has developed Line Pipe specifications and datasheets tailored to our projects. The Line Pipe specification is based on international standard API 5L PSL2 + specific requirements for line pipe in high H2S service.

- **Diverse Reequipments**: Our specifications is vary in requirements and level of details, reflecting the complexity of our operations.

- **Material Restrictions**: Seamless line pipe is used mainly because of fluid compatibility issues. This will be detailed in the following slides.

- **Compliance:** It is imperative that all technical and material details on the datasheets are followed in accordance with the associated specifications

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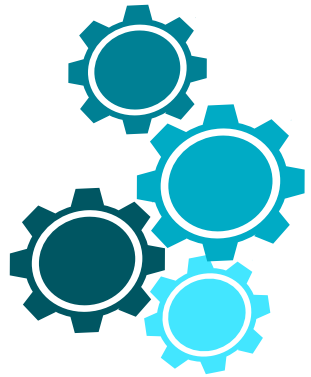
Linepipe



2

LinePipe Key Features

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LinePipe Key Features - General

KPO b.v. mainly utilize various sizes of X60 seamless Linepipe for Gathering and Gas Re-injection systems (KPO-00-PLS-SPC-00003).
In addition to linepipe, the pipeline design requires hot induction bends along the pipeline route.
Hot induction bends is fabricating from linepipe with thicker wall thickness (mother pipe) (KPO-00-PLS-SPC-00007)
The minimum mother pipe wall thickness after bending shall be not less than the minimum wall thickness of the run pipe.

Service Condition: Designed for high pressure and sour service (350 barg, 475 barg 605 barg)

Material Requirements: Linepipe & Induction bends properties shall meet the requirements of NACE MR0175/ISO 15156

Manufacturing Compliance: Linepipe & Induction bends shall be manufactured in accordance with the relevant COMPANY Specification and Data Sheet.

Approved Mills: KPO-approved mills for line pipe materials are Tenaris, KSP Steel (only 10", 23.8mm WT), PM Piping. Any other mills must undergo the Company qualification approval process as per KPO specifications.

The specification General requirements:

API 5L X60Q SMLS – Quenched and tempered (seamless)
Chemical composition: as per API 5L Annex H (amended by Company specification requirements)

Line pipe shall meet: API 5L PSL2 requirements (Sour Service)

Impact test: **MDMT** minus 45 degC

Hardness test: as per Company specification requirements

LinePipe Key Features - General

X60 Linepipe size which mainly used for the Projects:

Linepipe Size, inch	Wall thickness, mm
6	15.8 / 18.3
8	25.4 / 29 / 31.8 / 35.4
10	23.8 / 28.6
12	35 / 42.5
14	11.1 / 14.3
16	31.5 / 36.53
20",24"	

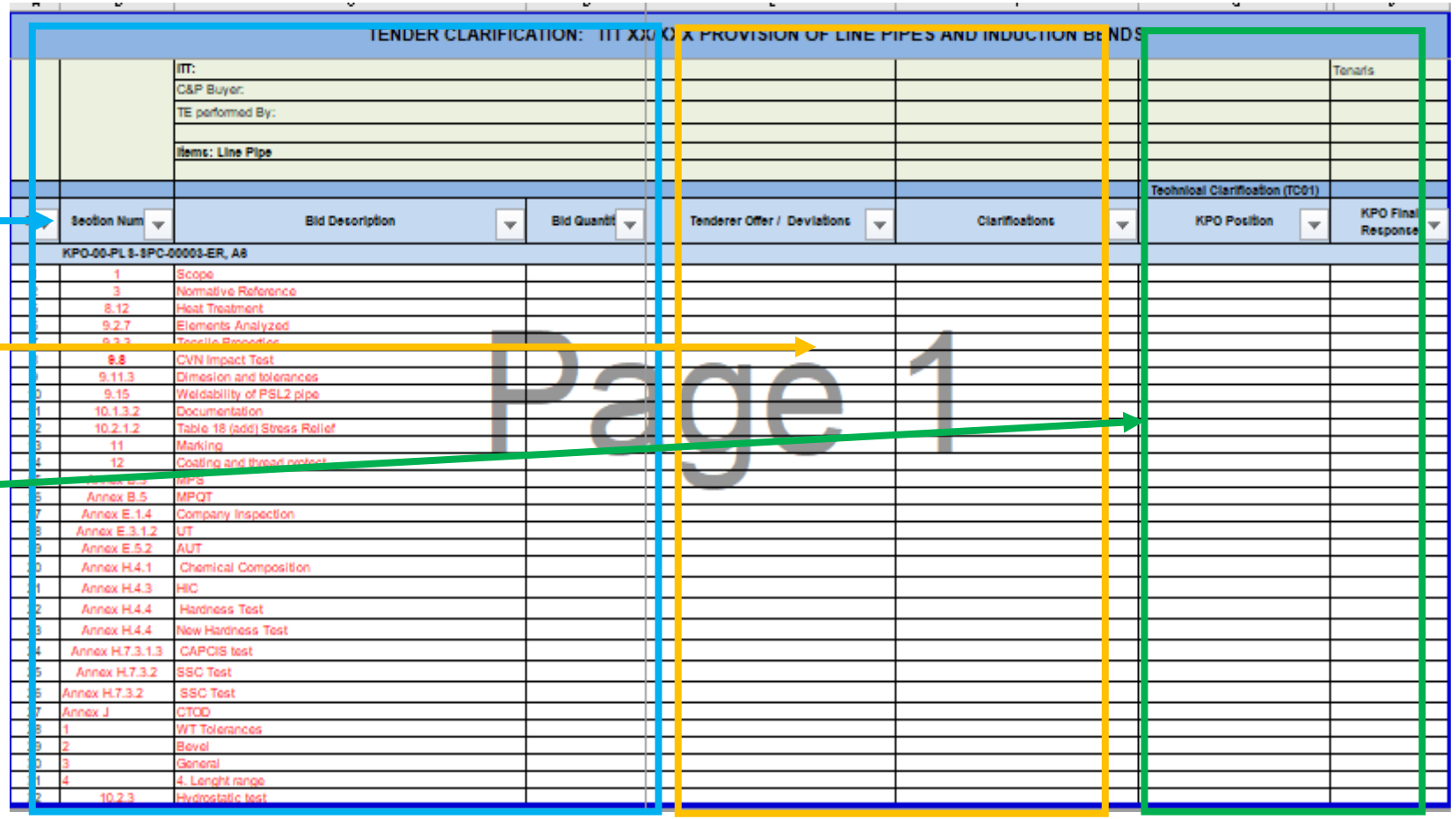
LinePipe Key Features – Documents TBE

Typical document requirement during the bid phase exchange between PED Eng. department and C&P department.

Required information from Company Specification

Column reserve to tenderers for confirm/deviate

Column reserve to Company for accept or reject the clarification by tenderers



TENDER CLARIFICATION: ITT XX.XX.XXXX PROVISION OF LINE PIPES AND INDUCTION BENDS

ITT:
C&P Buyer:
TE performed By:
Items: Line Pipe

Tenaris

	Section Num	Bid Description	Bid Quantit	Tenderer Offer / Deviations	Clarifications	Technical Clarification (TC01) KPO Position	KPO Final Response
	KPO-00-PL 8-SPC-00003-ER, A8						
	1	Scope					
	3	Normative Reference					
	8.12	Heat Treatment					
	9.2.7	Elements Analyzed					
	9.2.3	Tensile Properties					
	9.8	CVN Impact Test					
	9.11.3	Dimension and tolerances					
	9.15	Weldability of PSL2 pipe					
	10.1.3.2	Documentation					
	10.2.1.2	Table 18 (add) Stress Relief					
	11	Marking					
	12	Coating and thread protect					
	Annex B.5	MPS					
	Annex B.5	MPQT					
	Annex E.1.4	Company Inspection					
	Annex E.3.1.2	UT					
	Annex E.5.2	AUT					
	Annex H.4.1	Chemical Composition					
	Annex H.4.3	HIC					
	Annex H.4.4	Hardness Test					
	Annex H.4.4	New Hardness Test					
	Annex H.7.3.1.3	CAPCIS test					
	Annex H.7.3.2	SSC Test					
	Annex H.7.3.2	SSC Test					
	Annex J	CTOD					
	1	WT Tolerances					
	2	Bevel					
	3	General					
	4	4. Lenght range					
	10.2.3	Hydrostatic test					

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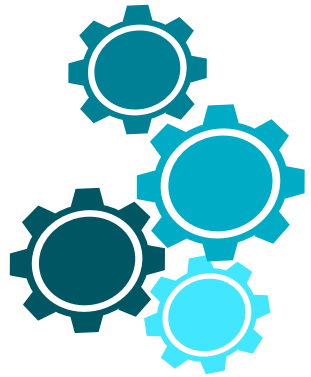
LINEPIPE COATING



3

Specification Overview

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LinePipe Coating Key Features - General

One of the main threats to pipelines is corrosion caused by water, chemicals, and soil conditions. Coating provide a barrier to prevent this. KPO pipelines requires specific type of coating as such as: Thermally insulation, Dual Fusion Epoxy coating.

Dual FBE Coating Requirements (ISO 21809-2) and COMPANY specification requirements (KPO-00-PLS-SPC-00019-ER):

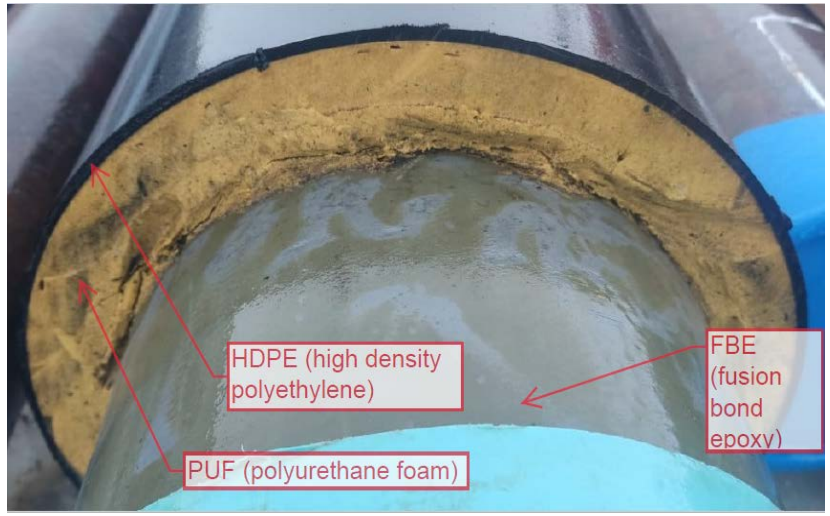
Coating thickness: 1st layer minimum 450 µm; 2nd layer maximum 860 µm
Temperature rating: -40°C / +110 °C

Thermally Insulation Coating Requirements (ISO 21809-2 , KPO-00-PLS-SPC-00018-ER):

FBE Coating thickness: minimum 450 µm;
Temperature rating: -40°C / +110 °C

PUF: Density ≥150 kg/m3 / ≥60kg/m3
Max operating temperature: 110°C

HDPE: Thickness 4-5mm; density ≥940kg/m3
Note: More detailed requirements specified in Company specification



Pre-qualification tests for FBE coating application is one of the main requirements of the COMPANY Specification.

Specification Overview - Core Technical Specifications

All material shall be supplied in full compliance with the LinePipe, Induction Bends and Coating Specifications and Data Sheets, reference in RFQ or PR line item, as well as the following KPO documentation :

S/N	Document Number	Title	Rev.
1	KPO-00-PLS-SPC-00003-E	Specification for API5L Seamless Linepipe for Sour Service	A7
2	KPO-00-PLS-SPC-00007-ER	Specification For Pipeline Induction Bends.	A1
3	KPO-00-PLS-SPC-00018-ER	Specification for Pipeline Coating and Thermal Insulation	A5
4	KPO-00-PLS-SPC-00019-ER	Specification for Fusion Bonded Epoxy Coating	A3
5	KPO-10-PLS-DTS-00001-ER	Gathering System – Linepipe. Line Pipe Data Sheet	A7
6	KPO-10-PLS-DTS-00003-ER	Induction Bend Data Sheet for Gathering Lines	C8
7	KPO-8B-PLS-DTS-00003-ER	Sour gas Re-Injection – Linepipes. Data Sheet	A7
8	KPO-8B-PLS-DTS-00005-ER	Induction Bend Data Sheet for Sour Gas Re-injection System	A1
9	KPO-00-QAC-SPC-00001-E	Supplier Welding Procedure Approval & Welding Quality Reequipments.	A4
10	KPO-AL-LGT-SPC-00001-E	I_01_Packing and Shipping Instructions	A8
11	KPO-AL-LGT-SPC-00002-E	I_02_Import Instructions	A7

Specifications & Data sheet

Data sheets includes (Example attached)

- Size, WT, Grade of Linepipe
- Service Condition
- Design Parameters
- Hydrotest Pressure
- Coating requirements
- Standards & Certifications compliance

LINE PIPE DATA SHEET / ВЕДОМОСТЬ ТЕХНИЧЕСКИХ ДАННЫХ ТРУБОПРОВОДА

GENERAL / ОБЩАЯ ЧАСТЬ	Unit	4" GATHERING HORIZONTAL FLARE LINES / 4" ПРОМЫСЛОВЫЕ ГОРИЗОНТАЛЬНЫЕ ФАКЕЛЬНЫЕ ЛИНИИ	6" GATHERING FLOWLINES / 6" ПРОМЫСЛОВЫЕ ШЛЕЙФЫ	6" GATHERING FLOWLINES / 6" ПРОМЫСЛОВЫЕ ШЛЕЙФЫ	10" GATHERING TRUNKLINES / 10" ПРОМЫСЛОВЫЕ МАГИСТРАЛЬНЫЕ ЛИНИИ	10" GATHERING TRUNKLINES / 10" ПРОМЫСЛОВЫЕ МАГИСТРАЛЬНЫЕ ЛИНИИ	1" CORROSION INHIBITOR LINES / 1" ЛИНИИ ИНГИБИТОРА КОРРОЗИИ	16" GATHERING TRUNKLINES / 16" ПРОМЫСЛОВЫЕ МАГИСТРАЛЬНЫЕ ЛИНИИ	18" GATHERING TRUNKLINES / 18" ПРОМЫСЛОВЫЕ МАГИСТРАЛЬНЫЕ ЛИНИИ
QUANTITY / КОЛИЧЕСТВО		Note 1 / Примечание 1	Note 1 / Примечание 1	Note 1 / Примечание 1	Note 1 / Примечание 1	Note 1 / Примечание 1	Note 1 / Примечание 1	Note 1 / Примечание 1	Note 1 / Примечание 1
SUBMARINE OR LAND PIPE / ПОДВОДНАЯ ИЛИ НАЗЕМНАЯ ТРУБА		Land / Наземные	Land / Наземные	Land / Наземные	Land / Наземные	Land / Наземные	Land / Наземные	Land / Наземные	Land / Наземные
PRODUCT / ПРОДУКТ		OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА	OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА	OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА	OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА	OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА	CHEMICAL / ХИМРЕАГЕНТ	OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА	OIL+GAS+WATER / НЕФТЬ+ГАЗ+ВОДА
SERVICE / СРЕДА		WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)	WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)	WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)	WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)	WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)	NON SOUR / НЕКИСЛАЯ	WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)	WET SOUR (Note 8) / ВЛАЖНАЯ КИСЛАЯ (Примечание 8)
PIPE DESCRIPTION / ОПИСАНИЕ ТРУБЫ									
PIPE OUTSIDE DIAMETER / ВНЕШНИЙ ДИАМЕТР ТРУБЫ	inch / дюйм; mm / мм	4.5 / 114.3	6.625 / 168.3	6.625 / 168.3	10.75 / 273.1	10.75 / 273.1	1.315 / 33.4	16 / 406.4	18 / 457.2
WALL THICKNESS / ТОЛЩИНА СТЕНКИ	mm / мм	6.02	15.9	18.3	23.8	28.6	3.4	36.53 / 31.85	39.67
GRADE / КЛАСС ПРОЧНОСТИ	API 5L	X60 SMLS / БЕСШОВНАЯ ТРУБА X60	X60 SMLS / БЕСШОВНАЯ ТРУБА X60	X60 SMLS / БЕСШОВНАЯ ТРУБА X60	X60 SMLS / БЕСШОВНАЯ ТРУБА X60	X60 SMLS / БЕСШОВНАЯ ТРУБА X60	X52 SMLS / БЕСШОВНАЯ ТРУБА X52	X60 SMLS / БЕСШОВНАЯ ТРУБА X60	X60 SMLS / БЕСШОВНАЯ ТРУБА X60
SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА	MPa / МПа	415	415	415	415	415	359	415	415
SERVICE CONDITION / УСЛОВИЕ СРЕДЫ									
DESIGN PRESSURE / РАСЧЕТНОЕ ДАВЛЕНИЕ	MPa / МПа	10.2	35	35	35	35	35	35	35
PRODUCT FLOW TEMPERATURE / ТЕМПЕР-РА ПОТОКА ПРОДУКТА (Max Макс / Min Мин)	°C	+48 / 0	+48 / 0	+48 / 0	+48 / 0	+48 / 0	+48 / 0	+54 / 0	+50 / 0
DESIGN TEMPERATURE / РАСЧЕТНАЯ ТЕМПЕРАТУРА (Max Макс / Min Мин)	°C	+65 / -45	+65 / -45	+65 / -45	+65 / 45	+65 / -45	+65 / -45	+65 / -45	+80 / -45
MAXIMUM PRODUCT IMPURITY LEVEL / МАКС. УРОВЕНЬ ПРИМЕСЕЙ В ПРОДУКТЕ	mol % / моль %	5 / 3.5 / 6	5 / 3.5 / 6	5 / 3.5 / 6	5 / 3.5 / 6	5 / 3.5 / 6	- / - / -	2.3 (Note 10) / 4.5 (Note 10) / 5.4 (Note 10)	2.3 (Note 10) / 4.5 (Note 10) / 5.4 (Note 10)
		H20 / H2S / C02	H20 / H2S / C02	H20 / H2S / C02	H20 / H2S / C02	H20 / H2S / C02	- / - / -	H20 / H2S / C02	H20 / H2S / C02
OTHER REQUIREMENTS / ДРУГИЕ ТРЕБОВАНИЯ									
CHARPY - V NOTCH / НАДРЕЗ -ШАРПИ		YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО	YES / УТВЕРДИТЕЛЬНО
TEST PIECE SIZE / РАЗМЕР ИСПЫТУЕМОГО ОБРАЗЦА	mm / мм	10 x 5	10 x 10	10 x 10	10 x 10	10 x 10	10 x 2.5	10 x 10	10 x 10
TEST PIECE ORIENTATION / НАПРАВЛЕНИЕ ИСПЫТУЕМОГО ОБРАЗЦА		LONGITUDINAL / ПРОДОЛЬНОЕ	TRANSVERSE / ПОПЕРЕЧНОЕ	TRANSVERSE / ПОПЕРЕЧНОЕ	TRANSVERSE / ПОПЕРЕЧНОЕ	TRANSVERSE / ПОПЕРЕЧНОЕ	LONGITUDINAL / ПРОДОЛЬНОЕ	TRANSVERSE / ПОПЕРЕЧНОЕ	TRANSVERSE / ПОПЕРЕЧНОЕ
TEST TEMPERATURE / КОНТРОЛЬНАЯ ТЕМПЕРАТУРА	°C	-45	-45	-45	-45	-45	-45	-45	-45
ENERGY / ЭНЕРГИЯ - MINIMUM INDIVIDUAL / - МИНИМАЛЬНАЯ ИНДИВИДУАЛЬНАЯ	J / Дж	38	38	38	38	38	29	38	38
- AVERAGE OF 3 / - СРЕДНЯЯ ИЗ 3-Х	J / Дж	50	50	50	50	50	38	50	50
WELDING CONSUMABLE BATCH TEST REQUIRED / ТРЕБУЕТСЯ ИСПЫТАНИЕ ПАРТИИ СВАРОЧНЫХ МАТЕРИАЛОВ		Not Applicable / Не применимо	Not Applicable / Не применимо	Not Applicable / Не применимо	Not Applicable / Не применимо	Not Applicable / Не применимо	Not Applicable / Не применимо	Not Applicable / Не применимо	Not Applicable / Не применимо
HYDROTEST / ГИДРОТЕСТ — PRESSURE / ДАВЛЕНИЕ	MPa / МПа	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%	95% SMYS / МИНИМАЛЬНЫЙ ПРЕДЕЛ ТЕКУЧЕСТИ МАТЕРИАЛА 95%
DURATION / ПЕРИОД		Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд	Not less than 10 seconds / Не менее 10 секунд
TOLERANCE FOR WALL THICKNESS / ДОПУСК ДЛЯ ТОЛЩИНЫ СТЕНКИ		TOLERANCE AS PER COMPANY SPECIFICATION / ДОПУСК СОГЛАСНО СПЕЦИФИКАЦИИ КОМПАНИИ	Tolerance shall be as per API 5L	Tolerance shall be as per API 5L	Tolerance shall be as per API 5L	Tolerance shall be as per API 5L	TOLERANCE AS PER COMPANY SPECIFICATION / ДОПУСК СОГЛАСНО СПЕЦИФИКАЦИИ КОМПАНИИ	Tolerance shall be as per API 5L	Tolerance shall be as per API 5L
EXTERNAL COATING / ВНЕШНЕЕ ПОКРЫТИЕ		Note 9 / Примечание 9	Note 6 / Примечание 6	Note 6 / Примечание 6	Note 6 / Примечание 6	Note 6 / Примечание 6	Note 7 / Примечание 7	Note 6 / Примечание 6	Note 6 / Примечание 6

NOTES: / ПРИМЕЧАНИЯ

1) Refer to material requisition / Смотрите заявку на материал
2) The SUPPLIER shall read this Data Sheet in conjuction with COMPANY'S specification listed in the Purchase Requisition. / ПОСТАВЩИК должен прочитать данную Ведомость Технических Данных совместно с Техническими Условиями КОМПАНИИ перечисленными в Заявке на Закупку.
3) Proposed Chemical Compositions, Sample Certificates, All manufacturing procedure specifications/qualification test results shall be submitted to COMPANY for bid evaluation. / Предлагаемые Химические Составы, Образец Сертификата
Все тех. условия технологии производства / результаты испытания на соответствие тех. условиям должны быть предоставлены КОМПАНИИ для оценки тендерного предложения
4) Pipe joint length shall be 11.5m minimum and 12.5m maximum / Длина трубного соединения будет составлять минимум 11.5м и максимум 12.5м
5) The Energy values for subsize specimens shall be multiplied by the factors listed in KPO-00-PLS-SPC-00003-ER / Величины Энергии для уменьшенных образцов будут умножены на факторы/множители перечисленные в KPO-00-PLS-SPC-00003-ER
6) As per Specifications KPO-00-PLS-SPC-00018-E - Specification for Pipeline Coating & Thermal Insulation, KPO-00-PLS-SPC-00019-E - Specification for Fusion Bonded Epoxy Coating / Согласно Техническим Условиям KPO-00-PLS-SPC-00018-R - Технические Условия на Покрытия и Теплоизоляцию для Трубопроводов, KPO-00-PLS-SPC-00019-R - Технические Условия для Наплавляемого Эпоксидного Покрытие Трубопроводов
7) As per Specification KPO-00-PLS-SPC-00026-E / Согласно Техническим Условиям KPO-00-PLS-SPC-00026-E
8) As per Specification KPO-00-PLS-SPC-00003-E "Specification for API 5L SEAMLESS LINEPIPE for SOUR SERVICE" / Согласно Техническим Условиям KPO-00-PLS-SPC-00003-E "Технические Условия на БЕСШОВНУЮ ТРУБУ по стандарту API 5L для КИСЛОЙ СРЕДЫ"
9) Pipes coated as per Specification KPO-00-PLS-SPC-00019-ER - Specification for FBE coating; / Покрытие труб согласно Техническим Условиям KPO-00-PLS-SPC-00019-ER - Технические Условия на Эпоксидное Покрытие
10) BP2022 Production Profiles (provided by RPE) / Производственные профили БП 2022 (предоставлено RPE)
11) This document based on Project Data Sheet Number 23858-10F-D1D-1500-80000 / Данный документ основан на листе технических данных 23858-10F-D1D-1500-80000

MASTER
DCC 13 MAR 2023
Engineering and Technical Authority

REV. ИЗМ.	DATE ДАТА	DESCRIPTION / ОПИСАНИЕ	By / Выполнил	Check Провер.	Weld Eng Инженер Сварщик	Lead Pip. Вед.Инж. по Труб.	Eng.Exec.Man Мен-р Отдела Проек.
A7	03/03/2023	Re-issued for Purchase / Переиздано для Закупки	BB	AB	KK	GS	AZ
A6	28/04/2022	Re-issued for Purchase / Переиздано для Закупки	YN	GS	KK	AB	AZ
A5	11/10/2021	Re-issued for Purchase / Переиздано для Закупки	YN	GD	KK	GC / AB	AZ
A4	03/06/2013	Re-issued for Purchase / Переиздано для Закупки	GS	YG	JS	AJ	NA / AF
A3	25/01/2013	Re-issued for Purchase / Переиздано для Закупки	GS	YG	JS	AJ	NA / AF
A2	25/05/2009	Re-issued for Purchase / Переиздано для Закупки	S.F.	A.B.	D.B./J.S.	N.DU/N.G.	D.D./M.C.
A1	23/01/2007	hase / Издано для Закупки	K.M.	S.F.	G.H.	I.T.	D.D./M.C.

KARACHAGANAK PETROLEUM OPERATING B.V. - (KPO B.V.) / КАРАЧАГАНАК ПЕТРОЛЕУМ ОПЕРЕЙТИНГ Б.В. - (КПО Б.В.)
GATHERING SYSTEM - LINEPIPE / СИСТЕМА ВНУТРИПРОМЫСЛОВОГО СБОРА - ЛИНЕЙНАЯ ТРУБА

DATA SHEET NUMBER / НОМЕР ВЕДОМОСТИ ТЕХ. ДАННЫХ: KPO-10-PLS-DTS-00001-ER — REV. ИЗМ: A7

Field Joint Reparation Kit

In pipeline system, filed joint represent the areas where individual pipeline sections are welded together.

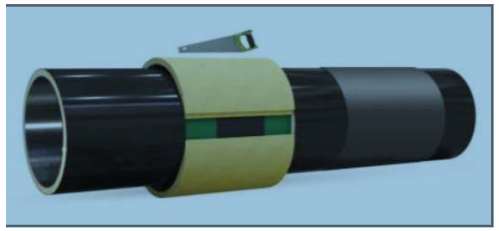
These area if joints is bare and requires restoring the protective coating which is **Field Joint reparation Kits (FJRK).**

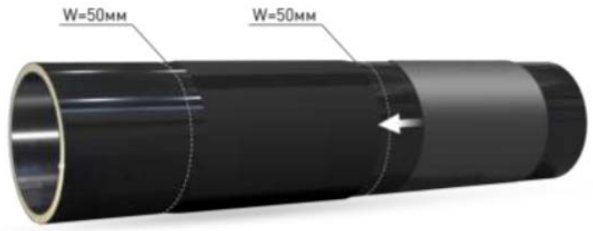
The **Field Joint Reparation Kits** required for Thermally Insulated and FBE coated pipelines.

FJRK for Thermally Insulated pipelines and FBE coated pipelines shall be according to COMPANY specification requirements (KPO-00-PLS-SPC-00027-ER)

A Pre-Production Trial / Pre-Production Test (PPT) shall be performed at the actual site of production field joint coating using the personnel mobilised for production FJC application in order to take into account the environmental and other site specific effects on the coating application.

Manufactures: KPO mainly uses Canusa or TIAL products.





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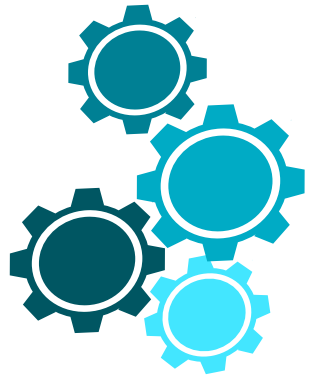


Operations Field department

Karachaganak

Insulation materials

3

Insulation materials overview

General Information

- KPO is currently using a range of insulation materials, used in various facilities, units and pipelines of the company.

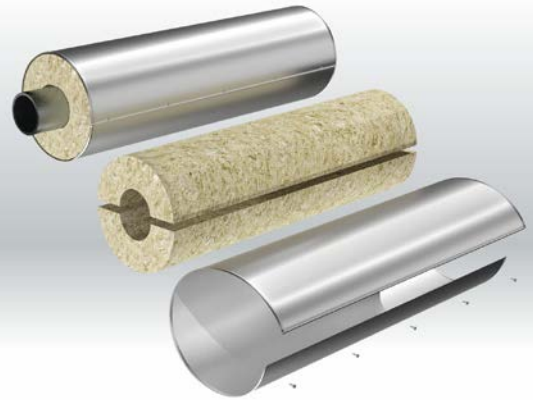
- The materials are critical for the process and are aimed to reduce losses of heat in pipelines and equipment, what is extremely important for maintaining the product temperature and preventing hydrocarbons crystallisation, which, in its turn, helps to improve energy efficiency of the systems.

- Proper selection of insulation materials contributes to reducing energy costs as additional heating or cooling requirement is reduced. Use of insulation materials ensure safety of personnel, reducing risks of burns from hot surfaces and providing required protection when working with toxic or flammable substances.

- All insulating materials must comply with established quality and safety standards and both to local and international norms, provided to ensure their reliability and efficiency.

- We have developed required technical specifications for insulation materials, which we are ready to present to you for review and making decisions.
  The details will be provided on the next slides.

Basic specifications of insulation materials – General information



- To cover KPO needs, various insulation material types such as mineral wool in rolls and mats, aluminium insulation, foam rubber insulation are used.
- Use of these insulation materials in the oil and gas industry increases process safety and efficiency and minimises the environmental impact.

Technical characteristics: Mineral wool cylinder

- A mineral wool cylinder is a non-flammable heat insulation cylinder of non-organic insulation nature, made of rock melt, sedimentary rocks, volcanic scoria, smelter slug, industrial silicate wastes. Mineral wool used for manufacturing of the cylinders is produced in accordance with GOST and TSs of manufacturing plants. Mineral wool cylinders are used to provide heat insulation of the pipelines with the outer diameter from 18 mm to 1420 mm with the transported media temperature range from -1800^{0}C to +7000^{0}C. Mineral wool cylinders are used for heating insulation of gas and oil pipelines.

Technical specifications	
Density of layer	100 kg/м3
Maximum operating temperature: t^{0}C	up to +600^{0}C
Internal diameter:	18 mm
Wall thickness:	50 mm
Length:	1-1.2 m.
The material complies with the procedure:	KPO-00-PIP-SPC-00020-E

Technical specifications: wire-sewed mineral wool mat

- The sewed mat МП-125, made of mineral wood on the basis of the basalt rock, is manufactured according to the GOST 21880-2011 and is used as common technical insulation for equipment and pipelines operated in the temperature range from -170°C to +450°C.

Technical specifications	
Density of layer:	100 kg/м3
Maximum operating temperature:	up to +600^{0}C
Dimensions:	4000 mm x 1000 mm
Thickness of layer:	50 mm
Length:	1-1.2 m.
The material complies with the procedure:	KPO-00-PIP-SPC-00020-E
Supplied in:	Rolls

Technical specification: foam rubber heat insulation

- Density of foam rubber insulation – 40-80 kg/m3. Presence of open pores not exceeding 10% is allowed. Various types of insulation materials allow operating an item in the temperature range from -200^{0}C to +175^{0}C; for this, they are used to ensure heating insulation not only for heating, water supply and air conditioning systems, but also for process pipelines. Foam rubber insulation is processable, resistant to chemicals and water, and capable of ensuring up to 70% of energy saving, as well as reliable long-lasting protection of pipelines from condensation.

Technical specifications	
Material:	Tube
Maximum operating temperature:	-40^{0}C/+125C
Diameter:	10 mm; 15 mm; 22 mm; 28 mm; 35 mm; 48 mm; 60 mm; 89 mm; 114 mm; 168 mm;
Wall thickness:	19 mm
Colour:	Black
Supplied in:	Sheets
Maximum operating temperature:	-40^{0}C/+125^{0}C
Width:	1 meter
Length:	6 meters
Sheet thickness	25 mm
Colour:	Black

Technical specifications: тaluminium sheet

- An aluminium sheet is a low-value and, compared with rolls of steel and other metals and alloys, light-weight material. An aluminium sheet is easy to treat, and ready items are durable, corrosion-resistant, highly strong from mechanical and atmospheric points of view.
- An aluminium sheet is necessary for the media, which required corrosion-resistance. Tapes are used to provide insulation of pipeline structures, they ensure waterproofing for water, oil and gas pipeline systems.

Technical specifications	
Width	0.914-1 m
Length	30 meters
Thickness	1.2 mm
Moisture barrier, type:	Polysurlyn
Requirements for aluminium:	Alloy 5005 or 3003-H14 or H16 Temper as per ASTM B209, an alternative according to the GOST ВД1 АМ
Barrier requirements:	
Thickness:	76 microns

Requirements to insulation materials

- **The following certificates must be provided by a manufacturer in the process of the given materials supply:**
- **Certificate of Conformity from the manufacturer (confirming compliance of filters to set standards and specifications);**
- **Certificate of Conformity to Standards (confirming the insulation materials to be manufactured in compliance with international standards as ASTM, BS, EN, ISO, etc.);**
- **Certificate of Origin: confirming the country of origin;**
- **Certificate 3.1 (for metal items): According to the Standard 10204, the Act of Acceptance confirms the goods, supplied to a client, to comply with the requirements set in the purchase order. Relevant testing results (e.g. strength test) shall be enclosed to the document;**
- **The supplied goods comply with the requirement set in the procedure KPO-00-PIP-SPC-00020-E.**

Note: Requirements to certificates will be additionally discussed at the stage of concluding a contract between KPO and a potential insulation materials manufacturer.

IMBC
International Machine Building Center

OVERVIEW OF IMB CENTER'S ACTIVITIES

KPO TECHNICAL WEBINAR ON LINEPIPES & PIPING AND INSULATION MATERIALS

SCOPE OF ACTIVITIES

MAJOR OPERATORS

CONSOLIDATION OF EFFORTS
PROVISION OF QUANTITATIVE AND TECHNICAL DATA

NCOC NORTH CASPIAN OPERATING COMPANY

ТЕНІЗШЕВРОЙЛ

Karachaganak

DATA PROCESSING & CONSOLIDATION

ADVOCACY ISSUES

IMBC International Machine Building Center

LOCAL MARKET ANALYSIS & CAPACITY DEVELOPMENT

LOCALIZATION & TECHNOLOGY TRANSFER

GOVERNMENT

FACILITATION AND STIMULATION
PREFERENCES & SUBSIDIES

MACHINE BUILDING INDUSTRY

CAPACITY DEVELOPMENT, INTERNATIONAL STANDARDS, TECHNOLOGY TRANSFER

COMMODITIES OF INTEREST

In our analyses of demands and identifying localization priorities, we utilize the FPAL coding system

FPAL Commodity Codes

1.01
Drilling Equipment

1.02
Material and Product Handling Equipment

2.99
Other Products / Equipment and Materials

Commodity Group A	Commodity Group B	Commodity Group C	Commodity Group D
1.09 Electrical Equipment and Materials	1.04 Pumps and Seals	1.02 Material and Product Handling Equipment	1.03 Compressors / Expanders / Blowers and Accessories
1.10 Instrumentation / Process Control Equipment / Materials	1.11 Process Filters	1.07 Heat Exchangers / Heat Transfer Equipment	1.05 Drivers and Accessories
2.02 Valves and Accessories	1.12 HVAC	1.16 Firefighting Equipment	2.03 Steel / Metal Materials
	2.01 Line pipe	2.07 Chemical / Oils / Paints	2.11 Workshop and Handtools
		2.08 Insulation / Refractory Materials	

Procurement in above commodity groups accounts for **over 75% of all procurement of goods** by three Operators **

* According to the statistical data of Situational-analytical center of the Fuel and Energy complex of the Republic of Kazakhstan

IMBC PROGRESS UNDER COMMODITY GROUPS

International Machine Building Center

	Commodity Group A	Commodity Group B	Commodity Group C	Commodity Group D
Demands analysis	35,000 items analysed	55,000 items analysed	7,000 items analysed	12,000 items analysed
High demand goods identified	19 types of goods	18 types of goods	27 types of goods	TBC
Market analysis, longlist from available resources	more than 90 manufacturers identified	more than 100 manufacturers identified	more than 80 manufacturers identified	TBC
Site surveys, manufacturers who expressed interest	72 site surveys conducted	61 site surveys conducted	41 site surveys conducted	TBC
Shortlisting, manufacturers producing types of goods with high demands	23 manufacturers shortlisted	16 manufacturers shortlisted	In process	TBC
Capacity development	8 CDPs developed	3 CDPs developed	TBC	TBC
Implementation of capacity development	3 recommended manufacturers	2 recommended manufacturers	TBC	TBC

Recommendations to Operators

LINEPIPES & PIPING AND INSULATION MATERIALS

LINEPIPES & PIPING PRODUCTS

Seamless, plastic, GOST Linepipe
821,958 m

Fastenings
108,442 ea/pk/box

Tubes, Fittings and Flanges
20,301 ea/pk

Gaskets and packings
84,529 ea/pk/box

INSULATION / REFRACTORY MATERIALS

Insulation (mineral wool)
95 782 rl, m, m2

Insulation (foam, jacket, sheet, fiber, blanket)
89 163 m, ea, m2, rl

technicalsupport@imbc.kz

+ 7 (7172) 39-99-66

www.imbc.kz

The range and specificity of services for assistance in the development of the potential of manufacturers, offered by IMBC, are limited and are subject to provision on an individual basis, depending on the readiness of the manufacturer to supply their manufactured goods in line with the requirements of the Operators.

Assistance from IMBC does not oblige any retaliatory action from the potential manufacturer. The services of IMBC do not represent a guarantee of the successful participation and / or successful award of Contracts to the manufacturer in the procurement processes of the Operators.

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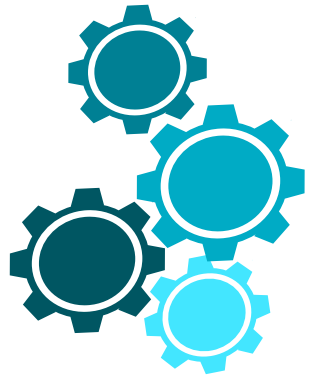
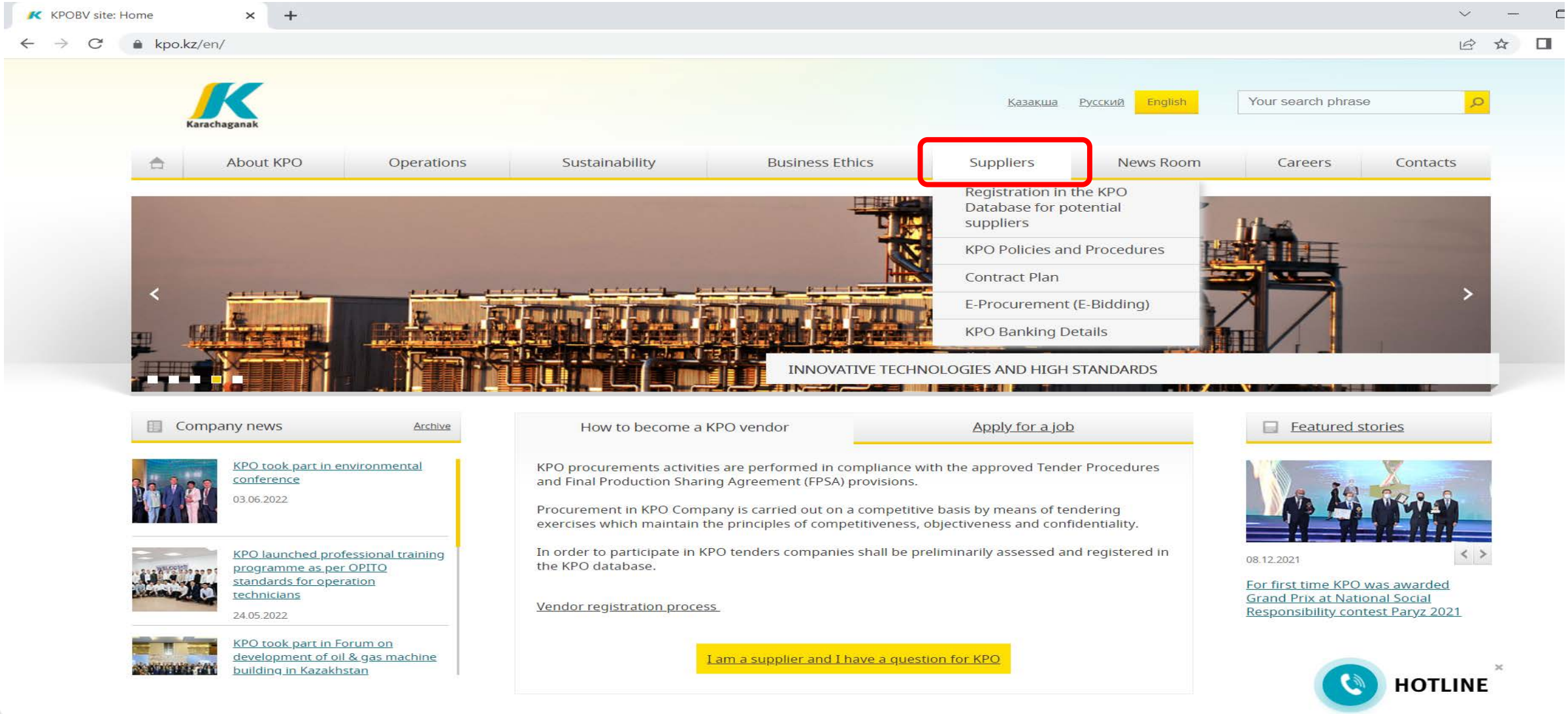


KPO Supplier Database

KPO SUPPLIERS DATABASE



VENDOR REGISTRATION

All potential suppliers shall be registered in KPO Database

REGISTRATION PROCESS

REGISTRATION

Provision of information on:
- Technical Competency
- Work Experience in the declared categories of goods and / or works and / or services
- Personnel Availability
- Financial Turnover
- etc.

ETHICAL DUE DILIGENCE

Define an Ethical Due Diligence level in accordance with KPO Legal requirements:

- Compliance with Kazakhstan and Foreign legislation
- Compliance with Company internal regulations
- Submission of potential suppliers shareholder lists

Vendor registration in KPO Vendor Database does not guarantee the participation in a tender or contract award, but suggests that a registered company may be considered as a market research participant for provision of goods, works and services for further pre-qualification process or tender as the need arises.

VENDOR REGISTRATION

- To register in KPO Vendor Database, potential supplies shall:
  - Download a questionnaire on KPO website – https://kpo.kz/ru/postavshchikam/registracija-v-baze-dannykh-postavshchikov-kpo
  - Fill in the questionnaire for the preliminary vendor assessment and indicate activity codes
  - Attach copies of required documents
  - Submit the completed pack of documents for vendor assessment and registration by e-mail at MIVQ@kpo.kz
  - Contact phone: +7 (711336) ext. 4943, 4946, 2192

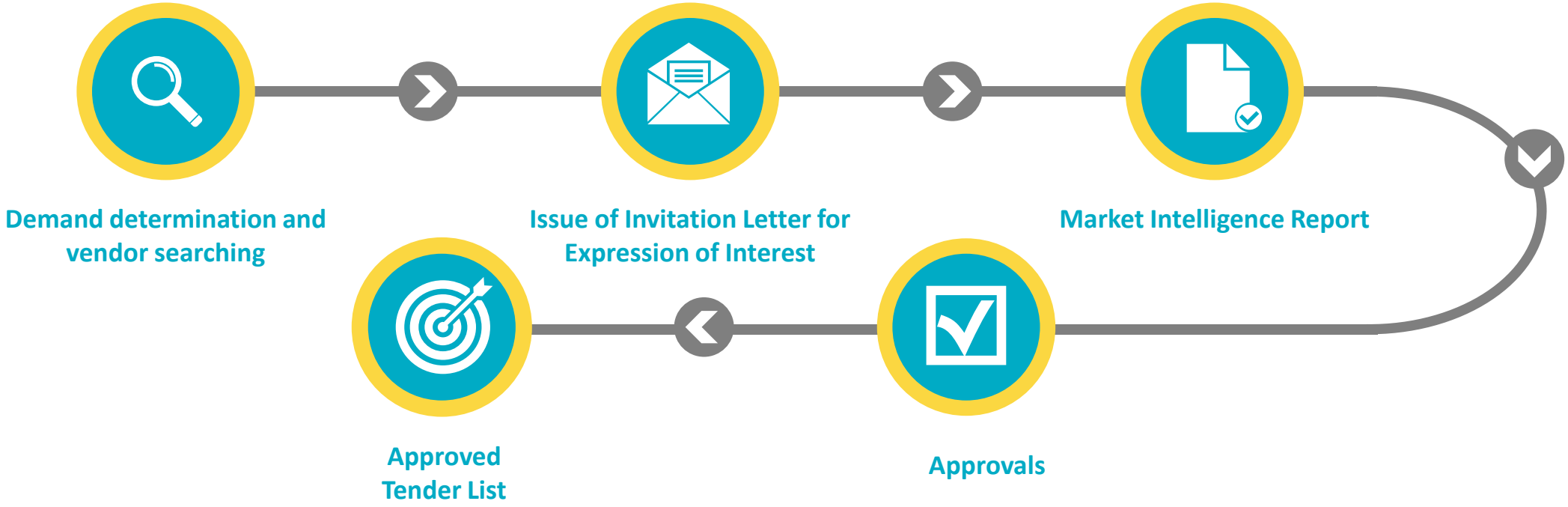
- KPO encourages Suppliers to update registration data on an ongoing basis, related to:
  - Work Experience in the declared categories of goods, works, services
  - Certification, accreditation
  - Reorganization
  - Contact persons

MARKET RESEARCH

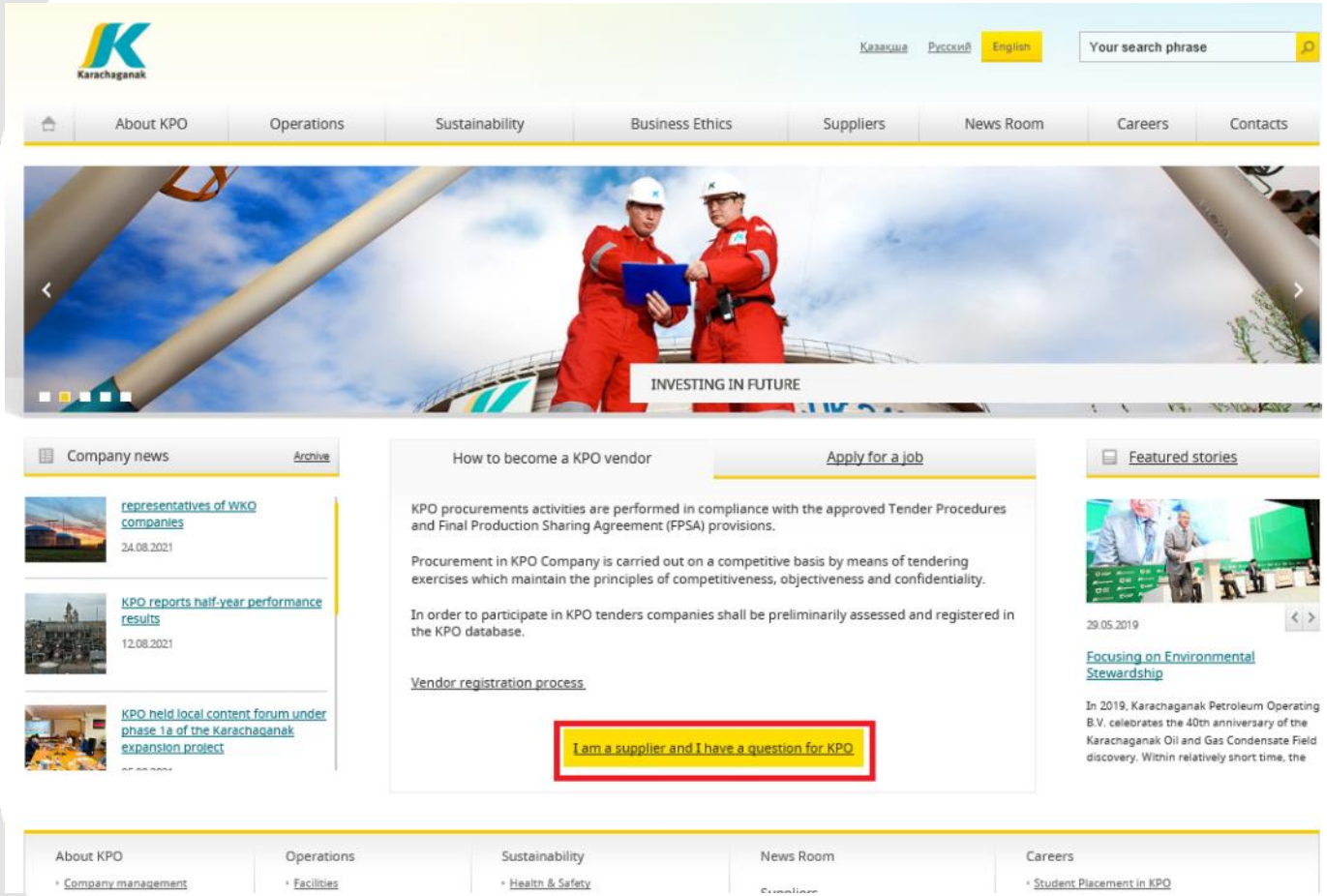
Purpose

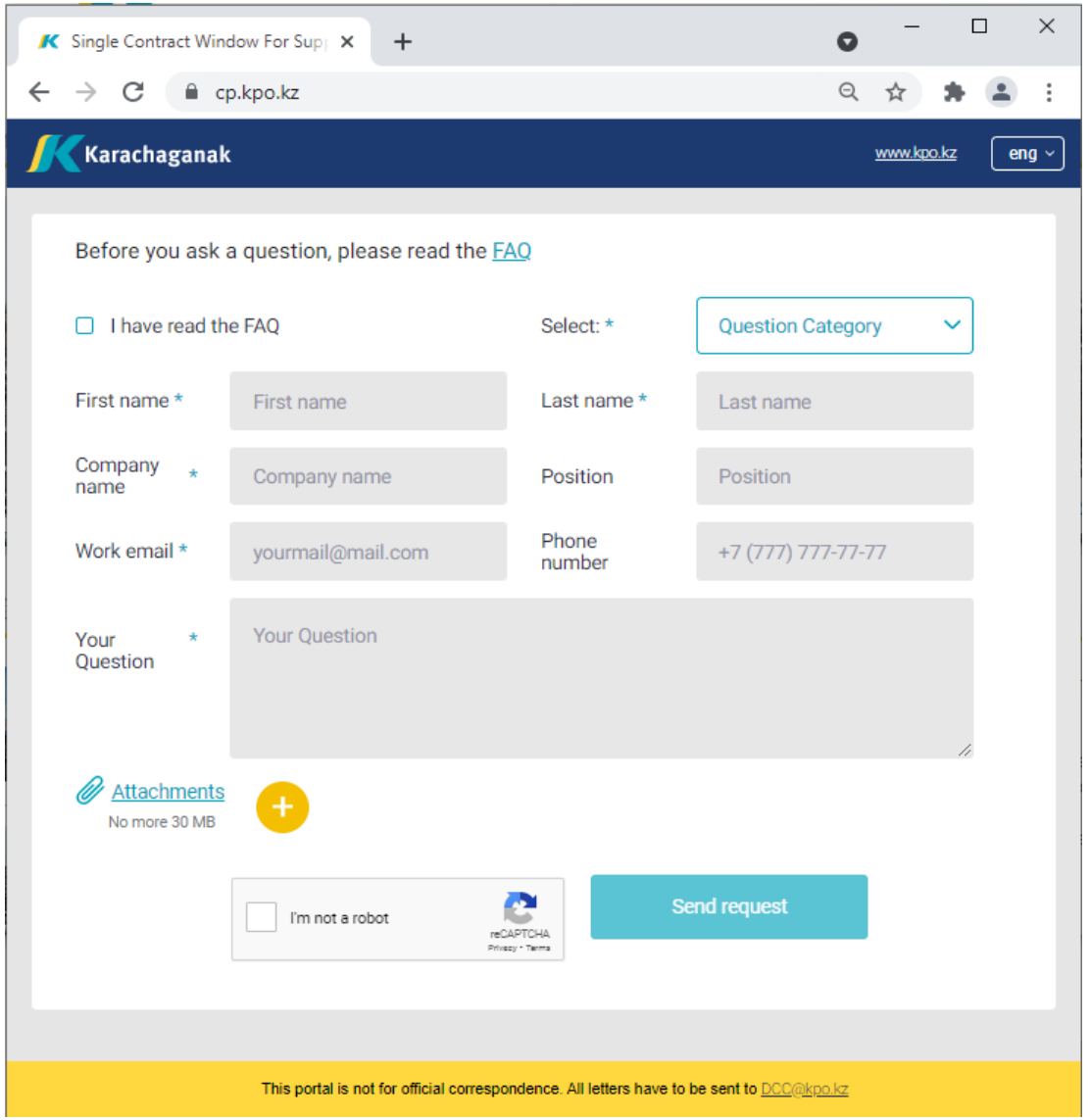
- Define potential suppliers of goods, works, services who can perform as per KPO requirements
- Ensure free competition for KPO tenders

PROCESS



''SINGLE WINDOW'' SYSTEM





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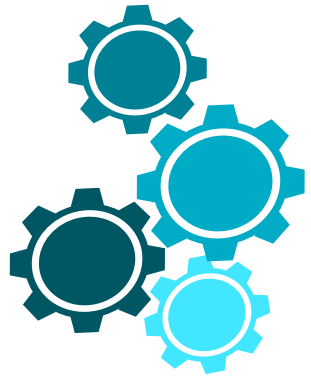
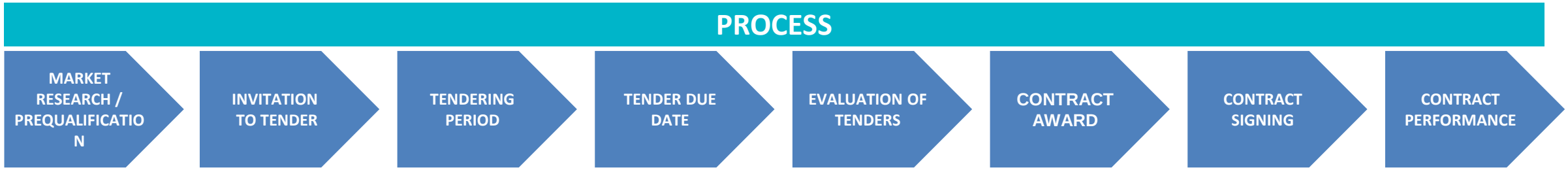


Procurement Process

PROCUREMENT PROCESS

KPO shall perform the procurement activities in accordance with:

- the Final Production Sharing Agreement (confidential and intended only for the use of KPO, its Shareholders and the Republic) and the Joint Operating Committee's Tender Procedures (JOC)
- current legislation
- approved budget and work program



MAXIMUM ATTENTION SHALL BE PAID TO

TENDER PACKAGES SUBMISSION REQUIREMENTS

TENDER PACKAGES SUBMISSION REQUIREMENTS THROUGH E-BIDDING SYSTEM
(Link to the instructions)

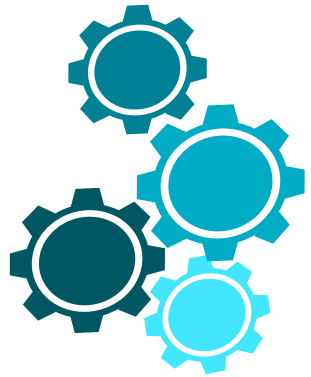
INSTRUCTIONS TO TENDERERS

TENDER DUE DATE / TIME

TENDER DOCUMENTATION CONTENTS

1. Cover letter
2. Forms, that shall be mandatorily signed, stamped and provided within timeframe specified:
   - Tender Acknowledgement and Confidentiality Agreement
   - Form of Tender
   - Certificate of Corporate Ownership and Declaration of Compliance
3. A package of documents related directly to the tender subject itself
4. Instructions to Tenderers
   - Form of Contract includes:
     - Form of Agreement
     - Schedule A – General Terms and Conditions
     - Schedule B – Scope of Goods/Services to be Supplied and Specifications
     - Schedule C – Compensation and Payment
     - Schedule D – Health, Safety and Environment (HSE) requirements
     - Schedule E – Special Conditions
     - Schedule F – Statement of Local Content
     - Schedule H – Industrial Relations
   - Questionnaire for Tender Participants
   - List of goods and technical delivery conditions (if applicable)
5. Instructions for preparing a tender proposal:
   - Instructions to Tender Participants
   - Bid marking template

Karachaganak



Local Content Mechanisms

SUPPORTING MECHANISMS FOR LOCAL COMPANIES

TRIAL ORDER

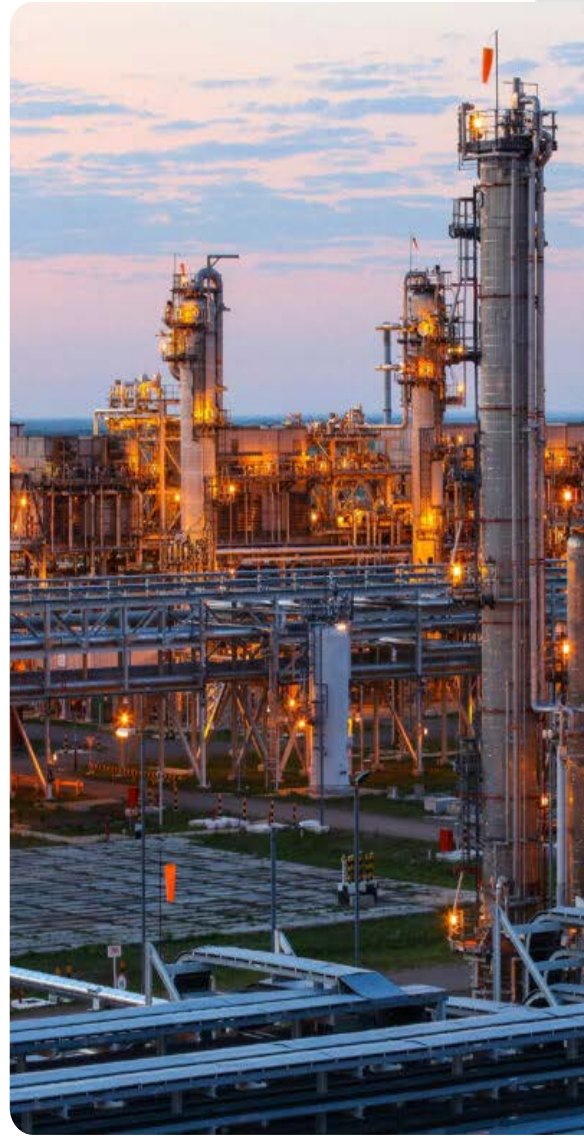
Tenders for testing a trial batch of GOODs from Kazakhstani suppliers

EARLY TENDER

Contract is concluded for the supply of GOODS with a suspensive condition or with a long-term delivery schedule

KAZAKH TENDER

Tenders exclusively among Kazakhstani Suppliers. The goal is to award contracts to Kazakhstani suppliers of GWS



CONTRACT IN **EXCHANGE** FOR INVESTMENTS (UNDER REVISION)

A contract in exchange for investment is a long-term contract concluded on a Single source basis, under which the supplier undertakes to produce goods of local origin that are the subject of a procurement contract in the territory of the Republic of Kazakhstan

Karachaganak

Thank you!