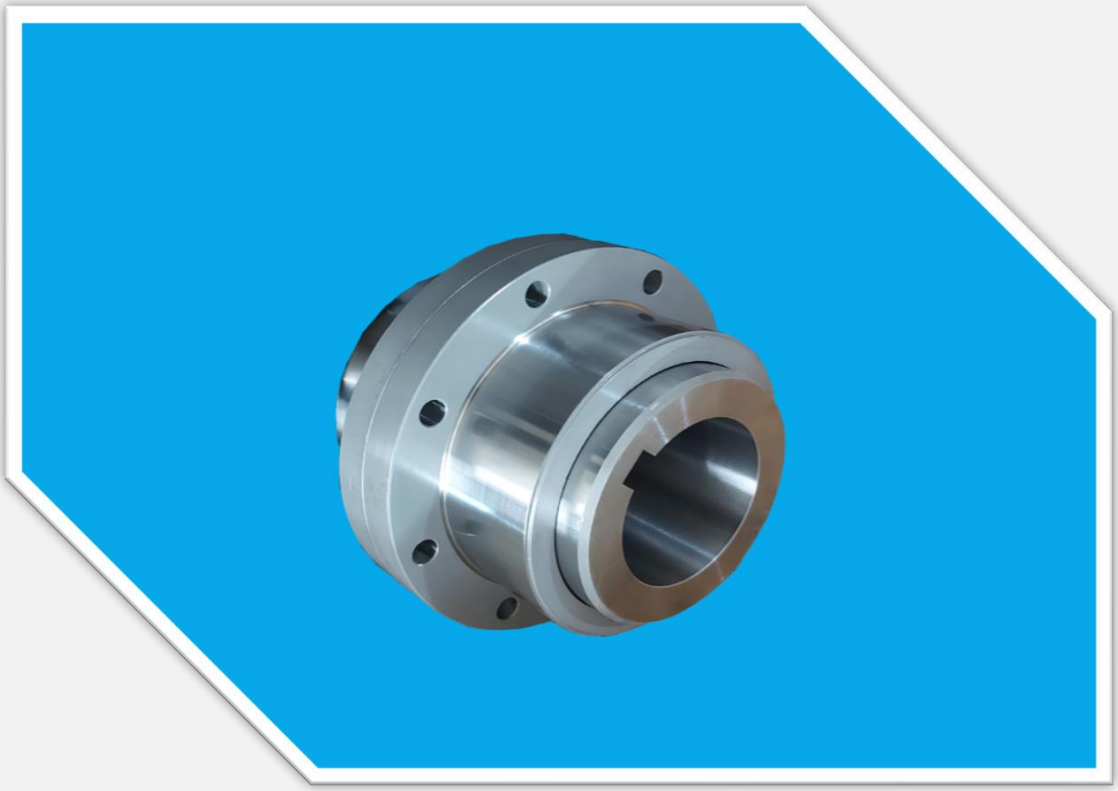
FAMIN®

# Gear couplings



A FAMIN Brand

FAMIN

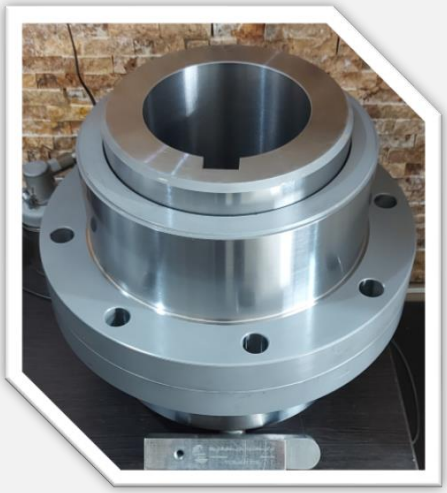
FAMIN®.
Experience, innovation
and close cooperation
with leading international
companies

FAMIN® is a leading supplier of couplings and power transmission solutions. Experience, manufacturing program, innovation and close cooperation with leading International companies in the business enables FAMIN® to provide customized solutions to our customers.
For over 20 years, FAMIN® has developed couplings for the most demanding applications in marine, wind energy, steel, railway and paper industries among others.
Our manufacturing program covers a complete range without boundaries in power and speed, and we continue developing new products for future challenges.

# MT Gear Coupling Introduction

**AURE MT Crowned Tooth Gear Couplings**

Famin was founded in Iran in 2001 as a machining workshop in one of the most industrialized areas with strong steel and iron tradition. Jaure's flexible coupling manufacturing activity as it is known nowadays started back in 2005 with the production Along the last 20 years, the design of Famin gear coupling has been continuously improved Thousands of Famin gear couplings are operating today in the toughest applications such as steel mills, pulp and paper, mining, cement, marine drives, wind turbines, etc.
MT gear couplings are the most compact coupling solution for critical applications that demand high torque transmission.



**Main advantages of MT gear couplings**
Famin® couplings offer maximum torque capacity. This is due to the optimum pitch diameter of the gears, providing reliability.

High permissible hub bore allows more favorable size selection of the coupling for a certain shaft diameter. This offers an important economic saving.

High permissible additional loads for starting and short-circuit peak torque.

Highest gear accuracy and quality thanks to the production improvements obtained with new CNC gear cutting machines and automatic charge systems.

The Famin MT standard range meets the AGMA standard, meaning that the MT coupling sleeves and drilled holes will fit any AGMA coupling halves. This ensures the interchangeability by coupling halves.
MT Gear
Coupling
Introduction

**Custom made couplings**
Special designs according to customer needs often come from close co-operation with our R&D and Engineering departments. Special solutions are normally based on the use of special seals and alloyed steels subjected to surface hardening treatments, such as:

Nitriding
Case carburizing
Induction hardening

# MT Gear Coupling Description

The MT gear coupling is a steel double-joint coupling. Main function is to transmit torque and at the same time accommodate the misalignment between two shafts.

The MT coupling is torsionally stiff and formed by two crowned hubs which engage two flanged sleeves with internal straight parallel teeth (see coupling parts at Fig nº1)

As a result of the teeth curvature, if shafts misalignment occurs, the crowned teeth hubs can oscillate in the flanged sleeve (see Fig nº2).

It is impossible to have corner pressure even at maximum misalignment. The combined tip and flank centering and fully machined coupling ensure smooth operation.

In case of high rotation speed (circumferential speeds exceeding 40 m/s or sensitive supports to unbalance) dynamic balancing is required.

The teeth are machined with precision gear machines in order to assure uniform contact

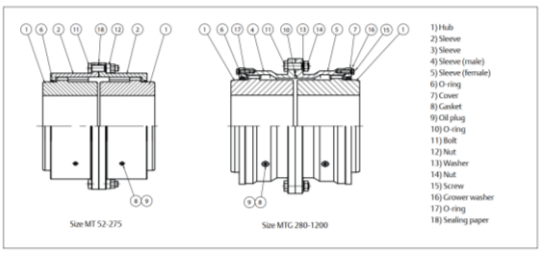



Fig nº1. Coupling components

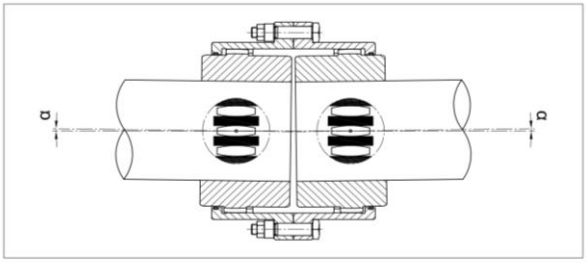



Fig nº2. Detail of the crowned teeth with angular misalignment

Coupling size for certain drive depends not only on the drive unit power and speed, but also on the misalignment and the type of machines to be coupled.

Three types of misalignment can be effectively accommodated by the MT gear coupling (see Fig. nº3):

Axial: Shafts are aligned but shaft ends are apart from each other.
Parallel Offset: Axes of connected shafts are parallel, but not in the same straight line.
Angular: Axes of shafts intersect at center point of coupling, but not in the same straight line

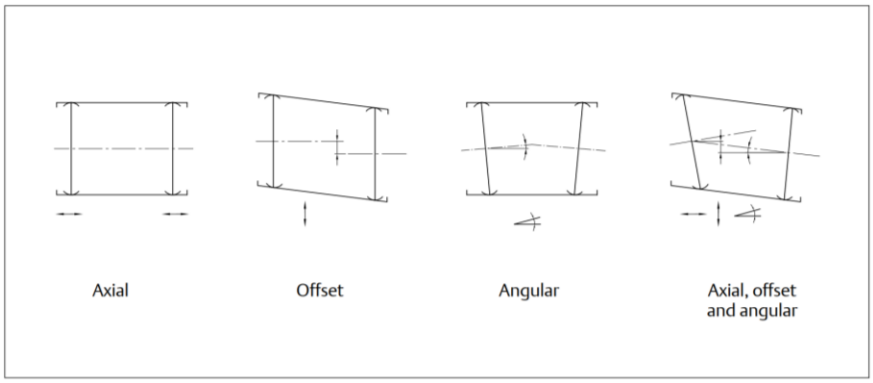



**Fig nº3. Shaft misalignment**

Proper maintenance of gear couplings is key to avoid early wear of the gear teeth and extend the coupling's life. It is necessary to strictly follow the installation and maintenance instructions.

The MT gear coupling must be filled with grease periodically. Therefore, the lubrication is forced into the teeth by centrifugal force. Seals are provided in the sleeves/covers to prevent any grease leakage. They can be used at -30°C to 70°C temperature range. For other temperature, please contact Famin.

The gear couplings are made in C45/55 material as a standard. If a more compact coupling or higher power ratio is required, Famin Heavy Duty Type (HD) in alloy steel is available in our program.

In addition other special designs with heat treatments such as induction hardening, gas nitriding, case hardening, etc can be delivered on demand. Please contact our engineering or sales departments.

For more detailed information refer to Famin instruction manual

## Coupling Selection

For MT standard design selection, the following data is required:

-PN, Installed or absorbed power (Kw)
-n, operating speed (rpm)
-L, d shaft lengths and diameters (mm)
-DBSE distance between shaft ends (mm)
-Service requirements (K service factor )
-Dynamic misalignment (Fα misalignment factor)
-Additional geometrical or atmospheric restrictions

Torque Capacity varies with speed and dynamic misalignment. A coefficient (fα = Coefficient factor from dynamic misalignment and speed) is required over 0,1 degrees of misalignment and is affected in the following trend:

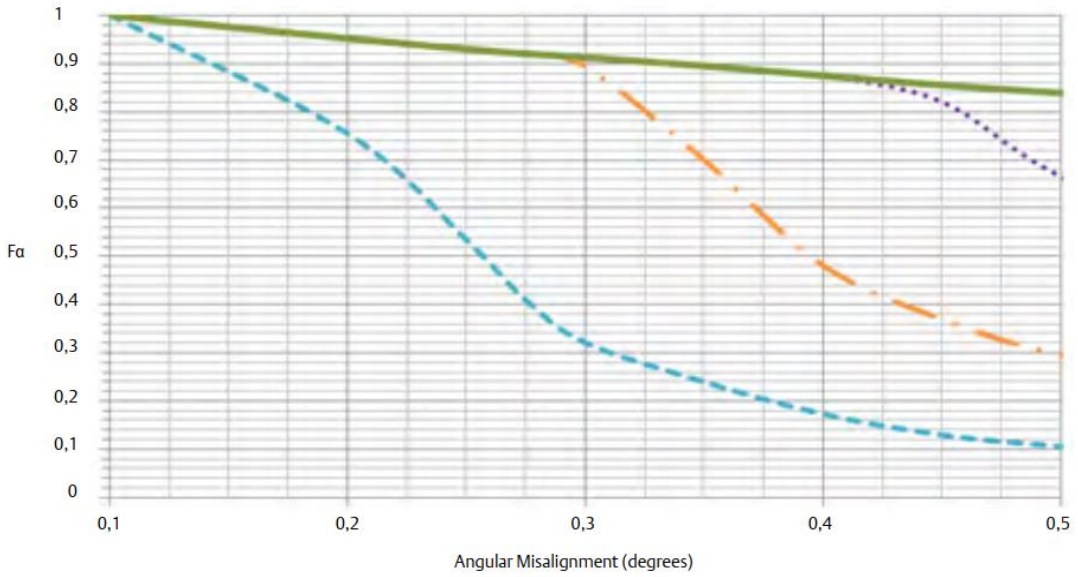



**Fig. nº 4 Trend of Coefficient with Dynamic Misalignment and Speed**

**n = n_max**
**n = 0.6·n_max**
**n = 0.4·n_max**
**n = 0.15·n_max**

Above graph shows one gear mesh misalignment.

Values shown in the graph are indicative. For accurate calculation or higher angular misalignment please contact Famin

Selection procedure

1) Calculate nominal torque TN (Nm) as follows:

$$T = 9550 \frac{P_N \cdot K}{n \cdot F\alpha}$$

PN= Max. actual power in (Kw)
n= Coupling speed in (rpm.)
K= Service factor
Fα = Misalignment factor

Select coupling size from catalogue with nominal torque capacity same or higher than obtained. Check if the peak torque of the application is below the coupling max. torque (TPmax).

2) Check in the catalogue maximum bore capacity for selected coupling. Should shafts be larger than the maximun admissible bore, select next bigger necessary size diameter.

3) Check shaft/hub connection is able to transmit the torque. If necessary, extend the hub length.

4) Speed given in catalogue is maximun value for unbalanced couplings. For higher operational speed the coupling must be dynamically balanced and other materials than carbon steels might be used. Please contact Famin engineering for support.

5) Selection Service Factors (K)

The service factor can vary for each application and depending among other on:

a. Type of driving and driven machine
b. Reversing / Non-reversing load
c. Peak torques

Example:

Find a coupling to connect a gearbox with the drum of a conveyor.
Motor power PN = 400Kw.
Peak torque: 7200Nm
Drum speed n = 1.000 r.p.m.
Gearbox shaft d1 = 80mm.
Drum side shaft d2 = 100mm.
Dynamic misalignment < 0,1 degrees. Fα=1
Service Factor for Conveyor Heavy Duty Not Uniformly Fed Assembly K=1.25

Solution:

$$T = 9550 \frac{400 \cdot 1{,}25}{1000 \cdot 1} = 4775 Nm$$

Nominal torque needs to be checked as a first step. From MT basic design, we would select MT-78. Secondly, we need to check maximum shaft capacity for selected size. This would lead to the selection of MT-112, as the drum shaft diameter is 100 mm.

Check that Peak Torque of application 7200 Nm is bellow selected coupling limit (28200 in this case).

With this selection, resulting Service factor can be calculated:
Since

$$T\ application = 9950 \frac{P_N}{n} = 9550 \frac{400}{1000} = 3820 Nm$$

Resulting Service Factor can be calculated as

$$K = \frac{14000}{3820} = 3{,}67$$

# Balancing

Coupling Balance requirements and limits are mainly dependent upon the characteristics of the application. For this reason balancing charts should be used as a guide only to assist in determining whether balancing is required or not.

Balancing chart is shown for average applications. For sensitive or critical application, contact Famin for coupling balance requirement.

**Balance Chart for non spacer type gear couplings**

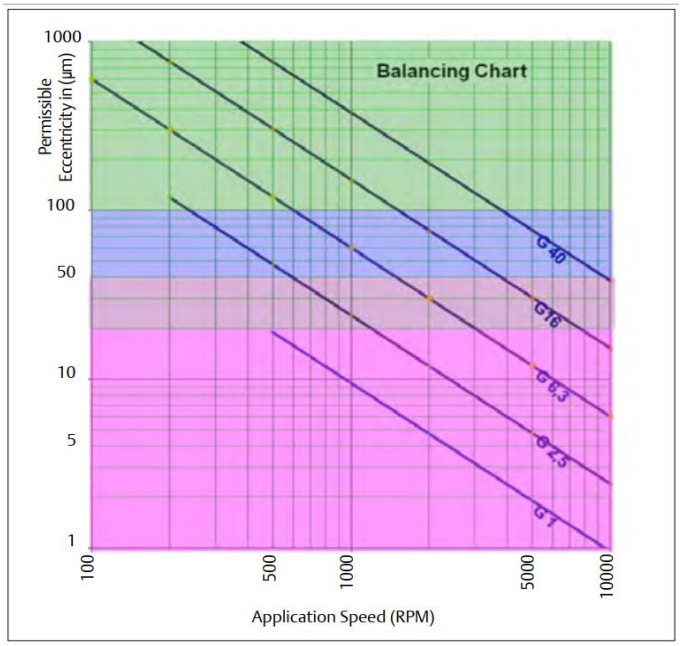



Fig. nº 5

Balance Chart for intermediate shaft couplings up to 1000mm of DBSE
(For higher DBSE please refer to Jaure)

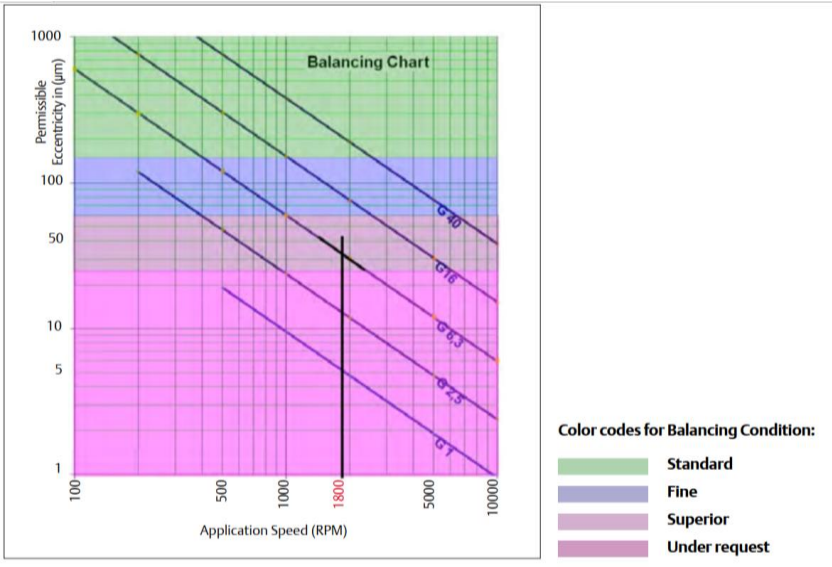



Fig. nº 6

# Balancing

Minimum applications data required for chart interpretation:

1. ISO balancing Grade for the coupling. (G)
2. Application Speed (n)

This information allows to calculate the permissible eccentricity (e permissible) for the coupling

e permissible = 9550.G/n

Where,

e permissible = Permissible eccentricity of center of gravity in μm.

e coupling = Actual eccentricity of center of gravity of coupling in μm.

G = Balance Grade in mm/s

n = Application speed in rpm.

In order to satisfy the application requirement, e coupling ≤ e permissible.

**Balancing Practices**

Famin couplings are dynamically balanced in component level or in sub-assembly.
In case of sub-assembly balancing level, major components are match-marked to ensure the proper reassembly of the coupling.
Hubs are component balanced at finished bore without keyways unless mentioned in the order.
On special request from customer, assembly balancing of gear coupling including gear hubs can be performed.
Balancing reports will be available for customer under request.
**Example**:

Coupling Type – Spacer type Gear Coupling.
DBSE – 600 mm
Required Balance Quality – 6.3
Application Speed – 1800 rpm

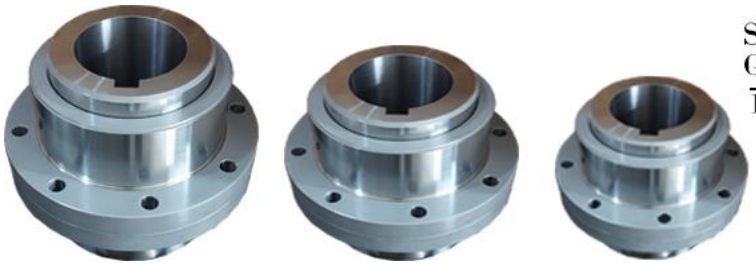
As per the chart, we require to perform the superior balancing for the spacer coupling to achieve the 6.3 balancing grade as per ISO-1940-1.

Alternatively:
e permissible = 9550.G/n
= 9550. (6.3)/1800
= 33,4 μm

From the chart (Y-axis) for 33,4 μm permissible eccentricity, coupling requires Superior balancing.

# Industrial designs

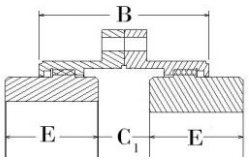
Famin gear couplings are used in a variety of demanding applications since years. Paper mill, cranes, pumps, conveyors and any process in a steel, aluminum or cooper mill are just some of the examples where Famin gear couplings are performing successfully.
Numerous designs and coupling sizes are available. The custom-made gear coupling offering is developed in close collaboration with the customer.



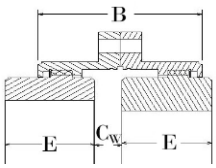
# SAMAN FATER RASHA
## Gear Couplings
### Full Flex Coupling size 1-7

SAMAN FATER RASHA

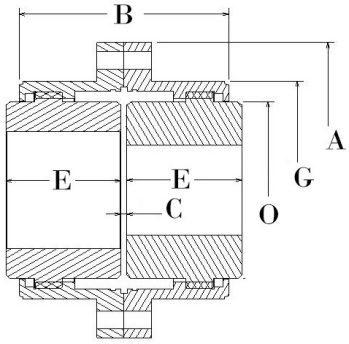
GEAR COUPLING Size 1-7




ONE HUB REVERSED




TWO HUBS REVERSED




| Coupling Size | Maximum Bore with Standard Key | Rating HP / 100 RPM | Torque Rating (lb.-in.) | Peak Torque Rating (lb.-in.) | Maximum Speed (RPM) | Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A | B | C | C1 | Cw | E | G | O |
| 1 | 1 5/8 | 10 | 6300 | 12600 | 10000 | 4 9/16 | 3 3/16 | 1/8 | 3/8 | 5/8 | 1 11/16 | 3 | 2 5/16 |
| 1 1/2 | 2 3/16 | 24 | 15100 | 30200 | 7400 | 6 | 3 7/8 | 1/8 | 9/16 | 1 | 2 1/16 | 3 13/16 | 3 1/8 |
| 2 | 2 3/4 | 50 | 31500 | 63000 | 5900 | 7 | 4 5/8 | 1/8 | 13/16 | 1 1/2 | 2 7/16 | 4 13/16 | 4 |
| 2 1/2 | 3 1/4 | 90 | 56700 | 113400 | 5000 | 8 3/8 | 5 11/16 | 3/16 | 29/32 | 1 5/8 | 3 1/32 | 5 23/32 | 4 23/32 |
| 3 | 4 | 150 | 94500 | 189000 | 4300 | 9 7/16 | 6 9/16 | 3/16 | 1 1/32 | 1 7/8 | 3 19/32 | 6 23/32 | 5 5/8 |
| | | | | | | | | | | | | | |
| 3 1/2 | 4 3/4 | 230 | 145000 | 290000 | 3900 | 11 | 7 5/8 | 1/4 | 1 5/16 | 2 3/8 | 4 3/16 | 7 3/4 | 6 5/8 |
| 4 | 5 3/8 | 350 | 221000 | 442000 | 3500 | 12 1/2 | 8 5/8 | 1/4 | 1 7/16 | 2 5/8 | 4 3/4 | 8 31/32 | 7 1/2 |
| 4 1/2 | 6 | 480 | 300000 | 600000 | 3200 | 13 5/8 | 9 5/8 | 5/16 | 1 5/8 | 2 15/16 | 5 3/8 | 10 3/8 | 8 1/2 |
| 5 | 6 3/4 | 650 | 410000 | 820000 | 2900 | 15 5/16 | 10 13/16 | 5/16 | 1 11/16 | 3 1/16 | 6 1/8 | 11 3/8 | 9 1/2 |
| 5 1/2 | 7 1/2 | 850 | 536000 | 1072000 | 2700 | 16 3/4 | 11 5/8 | 5/16 | 1 7/8 | 3 7/16 | 6 /5/8 | 12 9/16 | 10 27/64 |
| | | | | | | | | | | | | | |
| 6 | 8 1/4 | 1100 | 693000 | 1386000 | 2500 | 18 | 13 1/4 | 5/16 | 2 5/16 | 4 5/16 | 7 3/8 | 13 7/8 | 11 3/4 |
| 7 | 9 1/4 | 1600 | 1010000 | 2020000 | 2200 | 20 3/4 | 14 3/4 | 3/8 | 2 3/16 | 4 | 8 11/16 | 15 3/4 | 13 1/4 |

Sizes 5 1/2 , 6 and 7 are only available with exposed bolt sleeves. Type EB exposed bolt sleeves are standard.


Head Office: Mashhad Cheraghchi 36- Nasim 1 - No. 4
Workshop: Mashhad - Asian Highway - Azadi 131 - Fourth Intersection - Right - Saman Fater Rasha Company
Phone: 05136019582
Mobile: 09153129585
Fax: 05136653101

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