

## Evaluation Te

### SNAP-E Joint Properties Evaluation Results

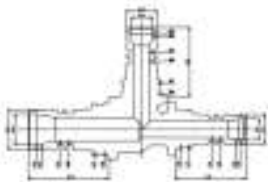
|                           |   |                       |  |   |                           |
|---------------------------|---|-----------------------|--|---|---------------------------|
| Hydraulic                 | Fatigue breaking test                               | CRITERIA              | Inspection of appearance of molded parts | Condition for ASTM F877                     |                           |
| Tensile                   |   | Leakage               |  | (1/2')                                      |                           |
| Tensile                   |   | Axial strength        |  | Pressure Rating                             |                           |
| Tensile                   |   | or above              |  | (160psi)                                    |                           |
| Tensile                   |   | no abnormality        |  | (100psi)                                    |                           |
| Hot Im                    |   | no abnormality        |  | (80psi)                                     |                           |
| Normal                    |   | no abnormality        |  | <b>TEST</b>                                 | 6-pcs                     |
| Raised                    |   | no abnormality        |  | 23C (73F) : 3.31Mpa (480psi)                |                           |
| Hot an                    |   | no abnormality        |  | 82C (180F) : 1.48Mpa(215psi)                |                           |
| Abnor                     |   | no abnormality        |  | 60-70 sec. Test                             |                           |
| Continuous Hot Water Flow | To be free from abnormality                         | Normal temp. x 0.2MPa | (B) HYDROSTATIC SUSTAINED PRESSURE       |   | 6-pcs                     |
| Slant                     | Vibration Test Hydrostatic sustained pressure test, | 95°C x 0.35MPa        | Testing Condition                        | 82C (180F)                                  |                           |
| Slant                     |   | 0.2MPa x Normal       | Temperature-Pressure                     | 1.34Mpa (195psi)                            |                           |
| No                        |   |                       |  | 1,000 Hour                                  |                           |
| Insert                    |   |                       |  | <b>TEST CYCLE</b>                           | 6-pcs                     |
| Leak                      | Thermo cycle, Excessive Temp.                       |                       |  | (or Immersion)                              | 16C x 2min. 82C x 2min.   |
| Joint                     | Pressure capability test                            |                       |  | Soak -time                                  | 2min. Each /Total: 8min   |
|                           |   |                       |  | Pressure                                    | 0.69Mpa(100psi) Air or N2 |
|                           |   |                       |  |   | 1,000 Thermal Cycle       |
|                           |   |                       |  | Test/ Burst Test                            |                           |
|                           |   |                       |  | <b>TEST TEMPERATURE-PRESSURE CAPABILITY</b> |                           |
|                           |   |                       |  | Environment                                 | 99C degree                |
|                           |   |                       |  |   | Air                       |
|                           |   |                       |  |   | 99C, 0.207Mpa Water x 2 h |
|                           |   |                       |  | Duration                                    | 1.304Mpa x 30days (720h)  |

# QC Flow

## Fitting Common QC Flow Chart (Draft)

MECH-Fit 樹脂本体 初回ロット検査記録 (1/6)

|          |            |
|----------|------------|
| 名前 / サイズ | Test 20    |
| 製造日      | 20100102   |
| ロットNo.   | 1001000000 |
| 数量       | 500        |
| 有効期限     | 1          |



| 項目 | A-1         |        |        | A-2         |        |        | A-3         |        |        | A-4         |        |        |
|----|-------------|--------|--------|-------------|--------|--------|-------------|--------|--------|-------------|--------|--------|
|    | 平均72.5-80.0 |        |        | 平均72.5-80.0 |        |        | 平均72.5-80.0 |        |        | 平均72.5-80.0 |        |        |
|    | 種別          | 種別     | 種別     | 種別          | 種別     | 種別     | 種別          | 種別     | 種別     | 種別          | 種別     | 種別     |
| 1  | 157.78      | 157.72 | 157.78 | 158.04      | 158.17 | 158.12 | 158.05      | 158.05 | 158.11 | 157.95      | 157.91 | 157.73 |
| 2  | 157.70      | 157.73 | 157.72 | 158.04      | 158.14 | 158.14 | 158.04      | 158.05 | 158.05 | 157.91      | 157.94 | 157.73 |
| 3  | 158.75      | 158.75 | 158.75 | 159.04      | 159.04 | 159.04 | 159.04      | 159.04 | 159.04 | 158.81      | 158.81 | 158.81 |
| 4  | 157.15      | 157.15 | 157.15 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 5  | 157.73      | 157.73 | 157.73 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 6  | 157.77      | 157.77 | 157.77 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 7  | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 8  | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 9  | 157.73      | 157.73 | 157.73 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 10 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 11 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 12 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 13 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 14 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 15 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 16 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 17 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 18 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 19 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 20 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 21 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 22 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 23 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 24 | 157.75      | 157.75 | 157.75 | 158.04      | 158.04 | 158.04 | 158.04      | 158.04 | 158.04 | 157.91      | 157.91 | 157.91 |
| 25 | 1           |        |        |             |        |        |             |        |        |             |        |        |

[illegible]

| 項目 | 2017年12月31日 | 2017年12月31日 |
|----|-------------|-------------|
| 項目 | 2017年12月31日 | 2017年12月31日 |
| 上  | 2017年12月31日 | 2017年12月31日 |
| 下  | 2017年12月31日 | 2017年12月31日 |
| 平均 | 2017年12月31日 | 2017年12月31日 |
| 標準 | 2017年12月31日 | 2017年12月31日 |
| MA | 2017年12月31日 | 2017年12月31日 |

|     |     |     |
|-----|-----|-----|
| 胡 芝 | 董 超 | 林 森 |
| 冯 勇 | 程 强 | 段 中 |

| Applicable Facility           | Made                   |
|-------------------------------|------------------------|
| Higashio Mech<br>Inoue Sudare | Revision<br>(Version ) |

| Control Item               | Inspection Item                | Criteria  | Lot Size           | Inspection Frequency | Number of Measurement | Measurement Method & Tools   |
|----------------------------|--------------------------------|---|--------------------|----------------------|-----------------------|------------------------------|
| Material of Polymer        | Brand Item No.                 | Nippon Polypro Novatec MA 3H  | Purchased Lot      | At each Delivery     | —                     | Check with Inspection Report |
| Appearance                 | Mold Inspection                | <div style="text-align: center;"> <h3>Inspection of Profile</h3> <p>of skew (miscenter) less than 0.03mm max</p> </div> |                    |                      |                       |                              |
| Dimensions of Molded Parts | Dimensional Accuracy           |   |                    |                      |                       |                              |
| Appearance                 | Appearance of Mold             |   |                    |                      |                       |                              |
| Weight of Molded Parts     | Part immediately after molding |   |                    |                      |                       |                              |
| Dimension of Molded Parts  | Dimensional Accuracy           |   |                    |                      |                       |                              |
| Shape of Molded Parts      | Shape of mold                  |   |                    |                      |                       |                              |
| Appearance                 | Appearance of Mold             |   |                    |                      |                       |                              |
| Dimensions of Material     | Inspection of Thickness        | Properties  | Specifications     | Delivered            | Delivery              | Report                       |
| —                          | —                              | <div style="text-align: center;"> <h3>× 1000</h3> </div>  |                    |                      |                       |                              |
| Material of Polymer        | Brand Item No.                 |   |                    |                      |                       |                              |
| Appearance                 | Mold Inspection                |   |                    |                      |                       |                              |
| Dimensions of Molded Parts | Dimensional Accuracy           |   |                    |                      |                       |                              |
| Appearance                 | Appearance of Mold             |   |                    |                      |                       |                              |
| Setting Conditions         | Setting Conditions             |   |                    |                      |                       |                              |
| Appearance                 | Mold Inspection                |   |                    |                      |                       |                              |
| Dimension of Material      | Dimension of Material          | As per Purchase Specifications  | Quantity Delivered | At each Delivery     | —                     | Inspection Report            |
| Setting Conditions         | Setting Conditions             | As per Purchase Specifications  | —                  | —                    | Every piece           | Visual                       |



# Quality Control

**ISO9001**  
Management System Certificate

Certificate Number: JQA-2447

Organization:  
**HIGASHIO MECH CO., LTD.**  
8-22 KIKUSUI-CHO, KARACHINAGANO-SHI, OSAKA, JAPAN

JQA certifies that the above organization operates the Quality Management System within the scope of the Appendix attached, which has been found to comply with the requirements of:

ISO 9001 : 2008 / JIS Q 9001 : 2008

Registration Date: July 3, 1999  
Last Renewal Date: August 6, 2009  
Expiry Date: August 7, 2012

**JQA**  
JAPAN QUALITY ASSURANCE CORPORATION  
TOKYO, JAPAN

Logos: CERTIFIED MANAGEMENT SYSTEM, JQA QUALITY SYSTEM, RMA, MS JAB CM000, ICNet

**J** TOTAL PRODUCTIVE MAINTENANCE

★★★★

**TPM**

TPM優秀賞

THIS IS IN RECOGNITION OF OUTSTANDING ACHIEVEMENTS IN THE MAINTENANCE OF TECHNIQUES / ABILITIES OF PLANT MAINTENANCE

Excellent

**P**

**The United States of America**

**The Director of the United States Patent and Trademark Office**

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

**United States Patent**

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law:

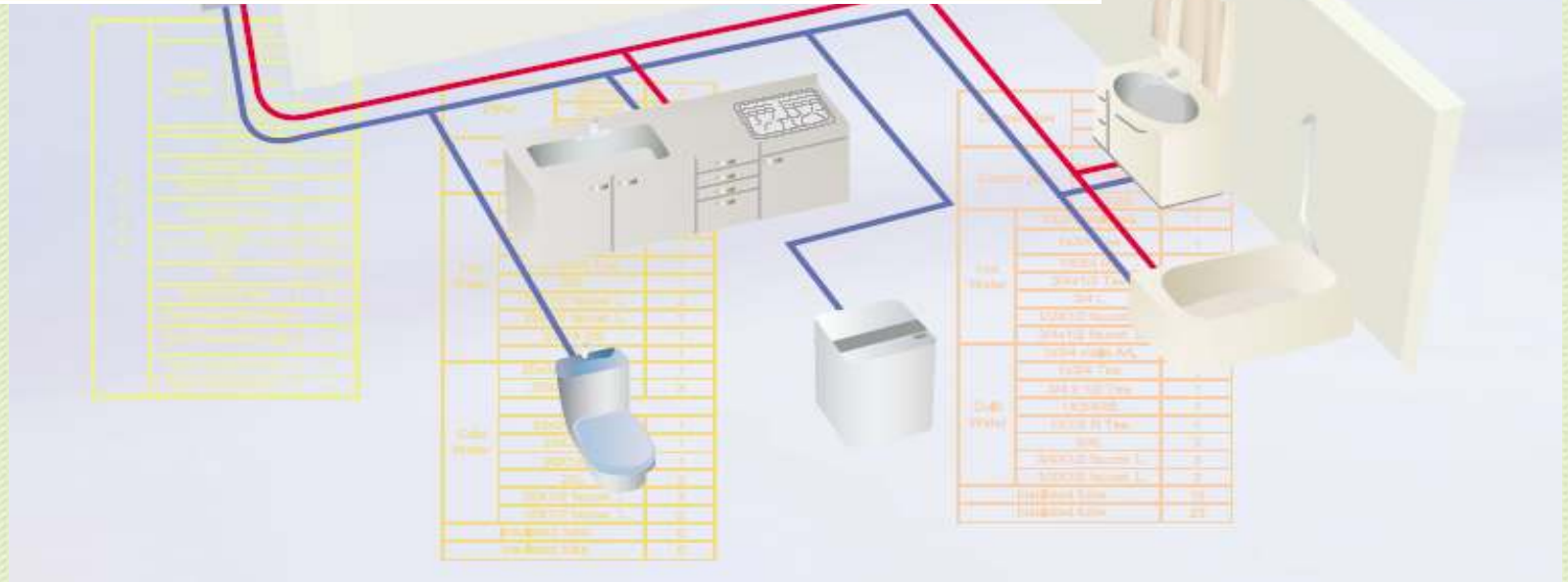
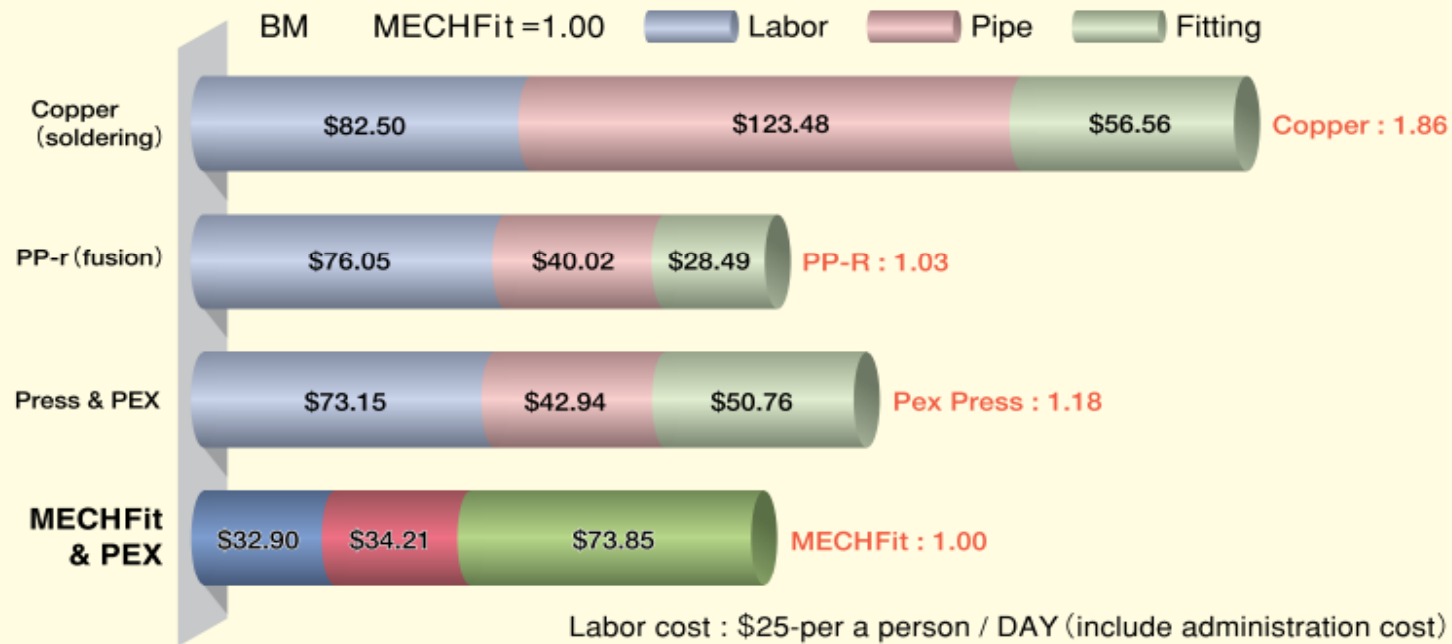
If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extensions.

*[Signature]*  
Director of the United States Patent and Trademark Office

*Ole M. Person*






## How the "MECHFit" Fitting Works? (Total Cost Comparison)





# MECHFit / New generation !

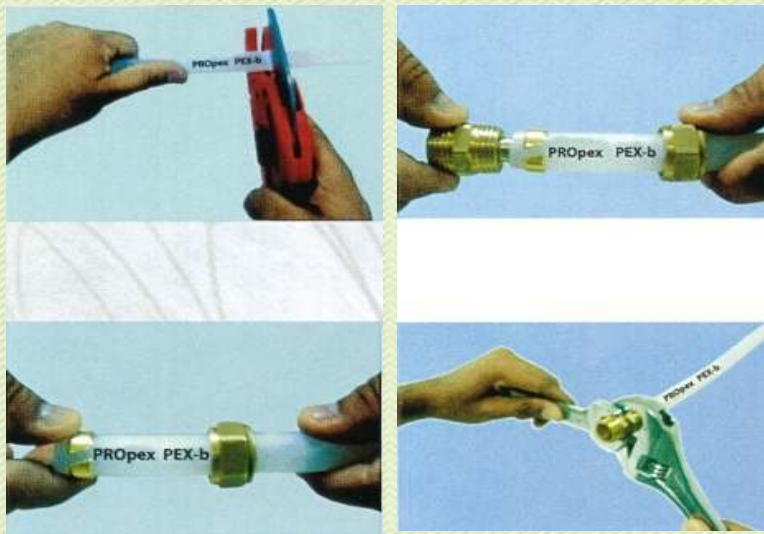
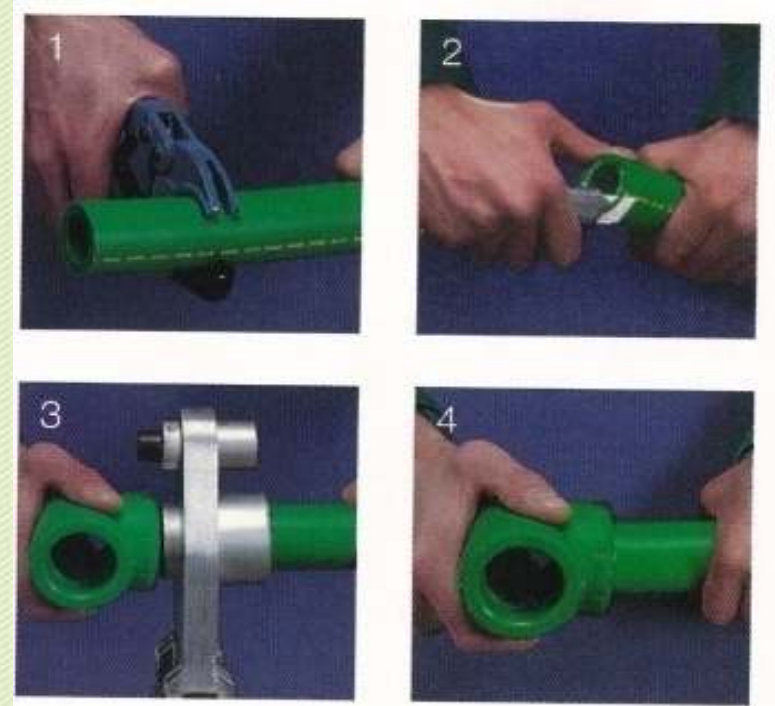
## Comparison

| Work Flow Chart        |                    |  |   |  |  |  |          |
|------------------------|--------------------|--|---|--|--|--|----------|
|                        |                    | Fire Risk  | Normal  | Fair   | Blow-out risk  | Excellent  |          |
|                        |                    | Brazing<br>   | Compression<br>                       | Machine Press<br> | Thermal Fusion<br>  | MECHFit<br> |          |
|                        |                    | Copper   | Stainless   | PE-X   | PP-r   | Multilayer   |          |
| [ 4 ]                  | <u>Cut of Pipe</u> | Pipe correct Sizing<br>De burr<br>Cleaning & buffing (pipe)  | Pipe correct sizing<br>De burr<br>Cleaning of pipe  | Pipe rough cut is okay<br>NIL<br>Cleaning of pipe  | Pipe correct sizing<br>De burr<br>Cleaning of pipe   | Pipe rough cut is okay<br>Calibration tool<br>(Round correction)<br>Cleaning of pipe           |          |
| <u>Not Good Points</u> |                    | Pin-hole trouble<br>Lime scale<br>Corrosion / pitting corrosion<br>Non-flexible pipe<br>Non-stable copper price<br>Heavy equipments<br>Installation skill of labor | Pipe twist & screw back risk<br>Lime scale<br>Corrosion<br>Non-flexible pipe<br>Quality of copper ring<br>Loosen of nut | Creep phenomenon<br>no O-ring fitting (some)<br>Metal detector<br>Machine jaw profile                | Temperature control<br>Rain water<br>Dust at the job site<br>Pipe thermal expansion<br>PPr welding sludge inside<br>Metal detector<br>Size application each<br>Installation skill of labor | Fitting cost high<br>Permanent joint   |          |
|                        |                    |  |   |  |  |  | COCOMECH |
| <u>Water leak test</u> |                    | Along with the manuals   | Along with the manuals  | Along with the manuals   | Along with the manuals   | Along with the manuals   |          |

# PP-r Thermal Fusion connection

- (1) Electric Power ----- voltage reduction risk
- (2) Temperature control----- decrease of device heat risk
- (3) Depth gauge ----- inadequate depth risk
- (4) Start up the heat device ---- different set-up risk
- (5) Hold to cool, straightforward —Holding time risk
- (6) SKILL is needed ----- imperfect connection risk

Tool (skill) was the key

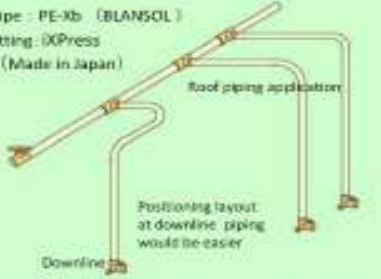



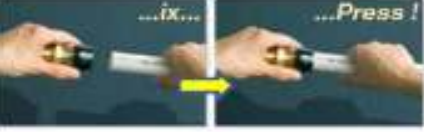



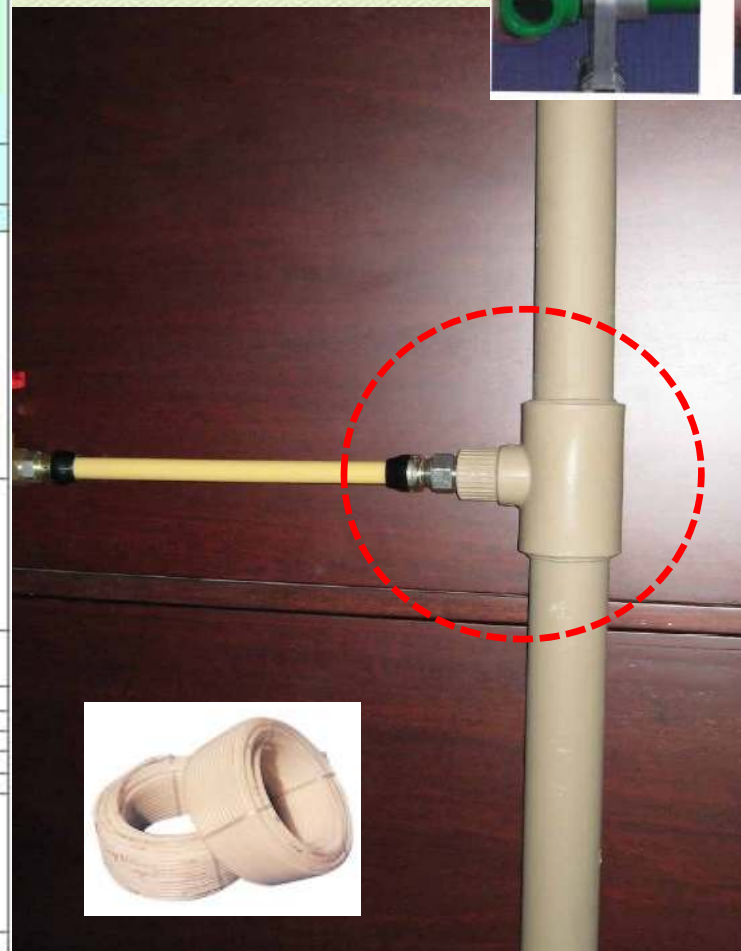
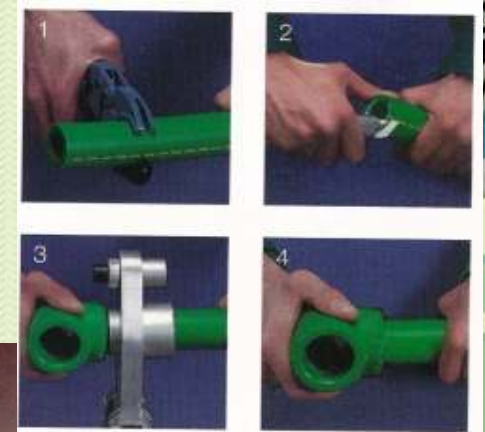
## ④ Compression type connection

- (1) Pipe twist & nut loosen risk
- (2) Creep & blow out risk
- (3) Stress corrosion crack risk



# PP-r vs MechFit

|            | PEX&ixPress (Our proposal)  | PPR&Fusion (Traditional method)   |
|------------|---|---|
| Model      | <p>Pipe : PE-Xb (BLANSQL)<br/>Fitting : iXPress (Made in Japan)</p>  <p>Roof piping application</p> <p>Downline</p> <p>Positioning layout at downline piping would be easier</p> |    |
|            | Flexible  | Piping layout → Difficult   |
| Fittings   | Shall use limited Elbows. small   | Fitting Q'ty → Many   |
|            | 3x Tee & 3x Faucet Elbow with base (6pcs in total)  | 3x Tee, 4x Elbow & 3x Faucet L with base (10pcs in total)   |
| Tool       | <p>No tool is necessary</p> <p>...Press!</p>    | <p>Fusing device (about 20kgs) needs electricity.</p>    |
| Inspection | <p>No skill for perfect installation. Quality can be checked easily by sight.</p> <p>No need</p> <p>Skills for jointing → Easy</p>  | <p>Important</p> <p>Depend on the installer's skill level, the quality would be various. No way to check.</p> <p>Impossible</p>   |
| Labor      | Less than 10s   | Time for jointing → 120~180s (over 2min.)   |
| Joining    | <p>Procedure ①Just push a fitting straight in a pipe.</p> <p>①One-push 4s</p>    | <p>Procedure ①②③④ repeat</p> <p>①Carry the special tool and set-up electricity. 20min</p> <p>②Heating ( both a fitting and a pipe ) 5-7s</p> <p>③Press to push for joint 4s</p> <p>④Cooling process 120s</p>  <p>It takes about 20min. to heat-up the fusing device.</p> |



# Project reference ( MECHFit)

**Physical  
Evidence**

| No. | Year | Name of Structure                      | Scale<br>(Units) | Area      | Client                            | Consultant                  | Construction Company   | MEP Construction Company | Situation          |
|-----|------|--|------------------|-----------|-----------------------------------|-----------------------------|------------------------|--------------------------|--------------------|
| 1   | 2009 | D-1 Tower                              | 80F              | Dubai     | Emirates Sunland                  | National Engineering Bureau | Kelle                  | Hastie International UAE | Under Construction |
| 2   | 2010 | Traders Hotel                          | 30F              | Qatar     | Sheikh Faisal Bin Qassem Al Thani | DIWAN                       | Al Habtoor Engineering | Target Rotary            | Under Construction |
| 3   | 2010 | National Convention Center (Extention) | 50,000M2         | Qatar     | Qatar Foundation                  | KEO International           | Midmac-Sixco J/V       | Midmac                   | Completed          |
| 4   | 2009 | Marina Bay Sands                       |                  | Singapore | Marina Bay Sands                  | MBS                         | Ssang Yong             | Shin Nippon              | Completed          |
| 5   | 2010 | Hotel 81                               | 3 Units          | Singapore | Hotel 81                          | C & P Consultants           |                        | Integrated Engineering   | Completed          |
| 6   | 2010 | Subway Chain                           |                  | Singapore | Subway                            | MPB Services                | MPB Services           | MPB Services             | Completed          |
| 7   | 2010 | Single Apartment @ Bayshore Park       | 1 Units          | Singapore | Owner                             |                             |                        | I & J Plumbing           | Completed          |
| 8   | 2010 | Single Apartment @ Dover Road          | 1 Units          | Singapore | Owner                             |                             |                        | Mel Works Engineering    | Completed          |
| 9   | 2010 | Single House @ Jalan Menarong          | 1 House          | Singapore | Owner                             |                             |                        | Aya Fuji Engineering     | Completed          |
| 10  | 2010 | Farrell Condominium                    | 60 Units         | Singapore | Premium Land                      | Architect 61 / UPC          | Chang Hua Construction | Markpoint Engineering    | Under Construction |
| 11  | 2011 | Hundred Tree Condominium               | 400 Units        | Singapore | City Development Limited          | Squiremech                  | Tiong Seng             | Markpoint Engineering    | Under Construction |
| 12  | 2011 | Volari Condominium                     | 80 Units         | Singapore | City Development Limited          | Squiremech                  | Tiong Seng             | Markpoint Engineering    | Under Construction |
| 13  | 2012 | NIPRO Medical Equipment factory        |                  | Indonesia | NIPRO                             |                             | SHIMIZU                | SHINRYO                  | Under Construction |



Job reference (Worldwide) : Clamp Ring Method 「COCOMECH FITTING」

## Dubai “D-1 Tower”

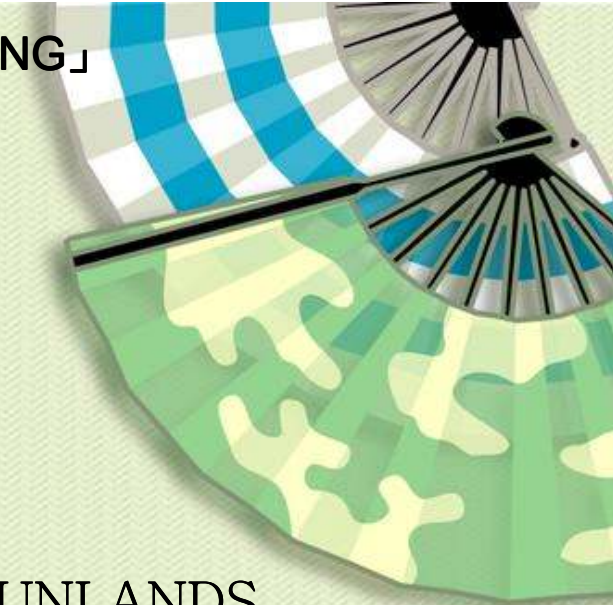
Dubai, U.A.E.

80 stories (284m high) Residential tower building  
(Approx. 455,000 fittings & 97,000m PEX pipes)



- Clients : EMIRATES SUNLANDS
- Consultants : National Engineering Bureau  
: Holfords Associates
- Main Contractor : Kele
- MEP Contractor : Hastie International

PEX pipe (16–32mm) were used for both horizontal and vertical piping line for hot and cold water supply.













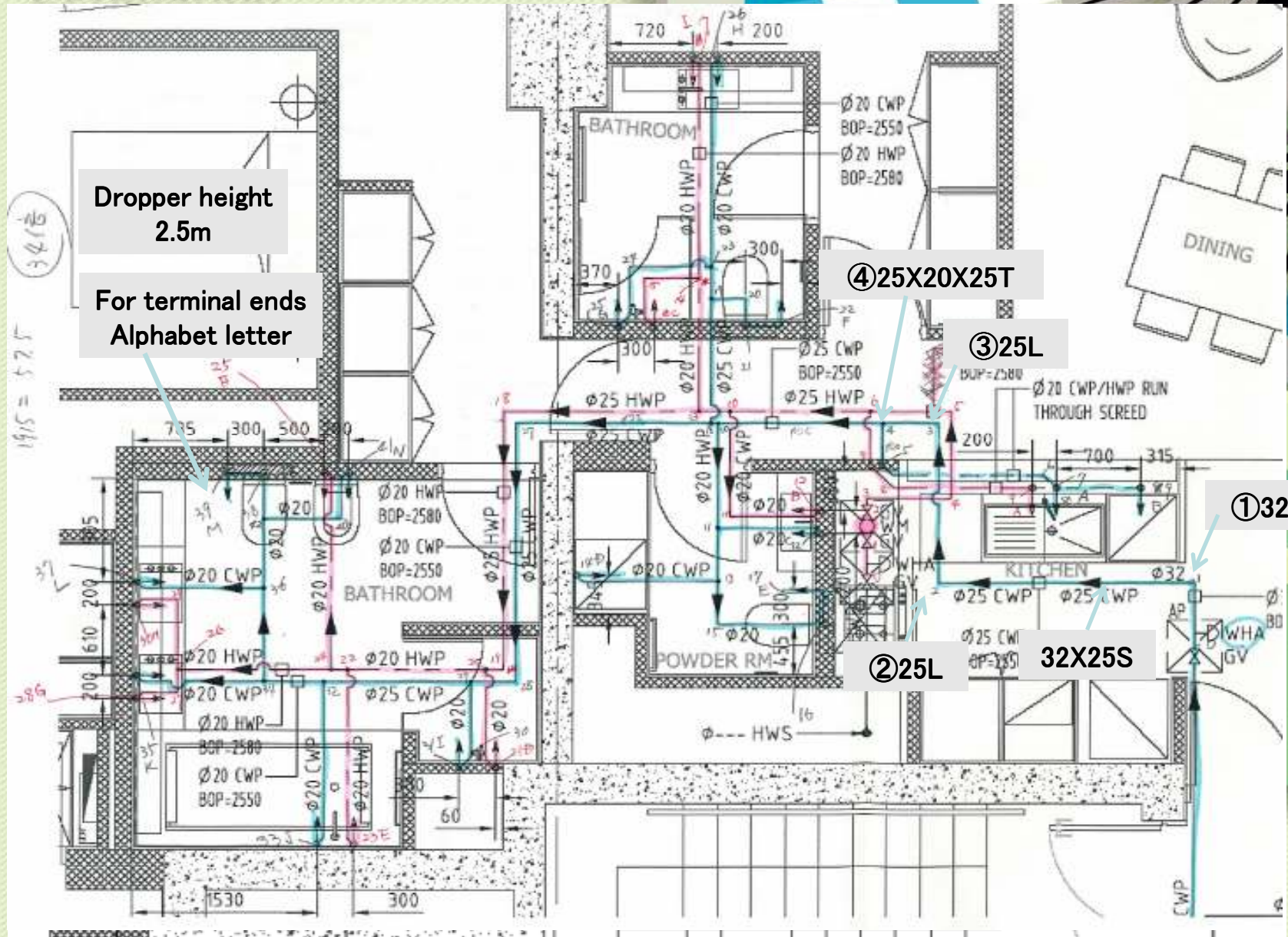


13/11/2010





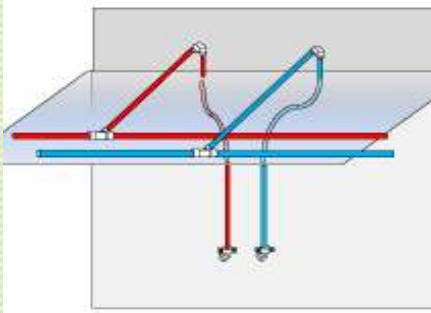
## 1



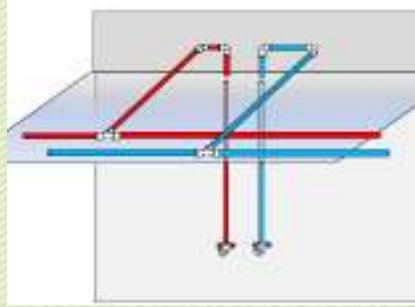


## 2 Estimation

MEHFit+PEX



PPr+ Thermal Fusion



PEX= No Elbow is necessary

PPr = Limited Reduction portfolio  
namely, need more fittings

PPr = Need socket at every 4m

| Pipe Length (m)     |         |    |          |
|---------------------|---------|----|----------|
| Ceiling             |         |    |          |
| 32                  | 1       |    |          |
| 25                  | 13      | 25 | 9        |
| 20                  | 23      | 20 | 18       |
| Down wall 14 points |         |    | 8 points |
| 20                  | 14x2=28 | 20 | 8X2=16   |
| total               |         |    |          |
| 32                  | 1       |    |          |
| 25                  | 13      | 25 | 9        |
| 20                  | 51      | 20 | 34       |

PRIMARY



| UNIT E     |              |          |                |           |                |      |              |
|------------|--------------|----------|----------------|-----------|----------------|------|--------------|
| Cold water |              |          |                | HOT water |                |      |              |
| 0          |              |          |                | 0         |                |      |              |
| 1          | 32L          | 27       | 25L            | 1         | 25x3/4MaleAD   | 28   | 20L          |
|            | 25X20RT      | 28       | 25L            | 2         | 25x3/4MaleAD   | G    | 20x1/2FL     |
| 2          | 25L          | 29       | 25X20RT        | 3         | 25L            | 29   | 20L          |
| 3          | 25L          | 30       | 20L            | 4         | 25L            | 30   | 20L          |
| 4          | 25X20RT      | 31       | 20L            | 5         | 25L            | H    | 20x1/2FL     |
| 5          | 20X45L       | I        | 20x1/2FL       | 6         | 25X20RT        |      |              |
| 6          | 20X45L       | 32       | 25X20X20RT     | 7         | 20X45L         |      |              |
| 7          | 20T          | 33       | 20L            | 8         | 20X45L         |      |              |
| 8          | 20L          | J        | 20x1/2FemaleAD | 9         | 20L            |      |              |
| A          | 20x1/2FL     | 34       | 20T            | A         | 20x1/2FL       |      |              |
| 9          | 20L          | 35       | 20L            | 10        | 25X20RT        |      |              |
| B          | 20x1/2MaleAD | K        | 20x1/2FL       | 11        | 20L            |      |              |
| 10         | 25X20RT      | 36       | 20T            | 12        | 20L            |      |              |
|            |              |          |                | B         | 20x1/2FL       |      |              |
| 11         | 20L          |          |                | 13        | 25X20RT        |      |              |
| 12         | 20L          | L        | 20x1/2FL       | 14        | 20T            |      |              |
| C          | 20x1/2FL     | 38       | 20L            | 15        | 20L            |      |              |
| 13         | 20T          | 39       | 20L            | 16        | 20L            |      |              |
|            |              |          |                | C         | 20x1/2FL       |      |              |
| D          | 20x1/2FL     | 40       | 20L            | 17        | 20L            |      |              |
| 15         | 20L          | 41       | 20L            | I         | 20x1/2FL       |      |              |
| 16         | 20L          | N        | 20x1/2FL       | 18        | 25L            |      |              |
| 17         | 20L          | 42       | 20T            | 19        | 25L            |      |              |
| E          | 20x1/2FL wB  |          |                | 20        | 25X20X20RT     |      |              |
| 18         | 25T          |          |                |           |                |      |              |
| 19         | 25X20X20RT   |          |                | 21        | 20L            |      |              |
| 20         | 20L          |          |                | D         | 20x1/2FL       |      |              |
| 21         | 20L          |          |                | 22        | 20T            |      |              |
| 22         | 20L          |          |                | 23        | 20L            | Down | 20L 8pcX2=16 |
| F          | 20x1/2FL wB  |          |                | E         | 20x1/2FemaleAD |      |              |
| 23         | 25X20X20RT   |          |                | 24        | 20T            |      |              |
| 24         | 20L          |          |                | 25        | 20L            |      |              |
| 25         | 20L          |          |                | 26        | 20T            |      |              |
| G          | 20x1/2FL     |          |                | 27        | 20L            |      |              |
| 26         | 20L          |          |                |           |                |      |              |
| H          | 20x1/2FL     |          |                |           |                |      |              |
|            |              | Downwall | 20L 14pcX2=28  |           |                |      |              |

# 3 Estimation LABOR CAL. (LABOR=LABOR RATE X PIPE LENGTH)

Labor rate (Commission rate) = 1 day 8h (Authorize by Japanese Government)  
 [Statically based commission rate] How many man does it need to joint 1 m ?

Labor/day  
 Cal. Rate  
 US\$32.00  
 \$4.00 /h



Based on "Estimation Standard List" in Japan, (Authorized by Japanese Government)  
 Labor cost per 8 hours per a day is listed as a personal labor cost standard include administration cost.

Sheet(4)

uPVC Pipe and fittings (BM)  
 TS connection 100%

|     | Commission rate*<br>(Person/m) | Labor cost<br>(US\$/m) |
|-----|--------------------------------|------------------------|
| 15A | 0.046                          | US\$1.47               |
| 20A | 0.062                          | US\$1.98               |
| 25A | 0.074                          | US\$2.37               |
| 32A | 0.079                          | US\$2.53               |

| 表 2-2-39 水道用耐衝撃性硬質塩化ビニル管 (HIVP) 水道用硬質塩化ビニル管 (給水) |    | 管径 (mm) |       |       |       |       |       |       |       |       |       |
|--|----|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 項目   | 単位 | 15      | 20    | 25    | 30    | 40    | 50    | 65    | 80    | 100   | 125   |
| 管内一組配管   | 人  | 0.046   | 0.062 | 0.074 | 0.079 | 0.103 | 0.128 | 0.143 | 0.159 | 0.245 | 0.301 |

PEX & Press system (Cal.)  
 Stainless Press (Listed)  
 Ppress 100%

|   | Commission rate<br>(Person/m) | Labor cost<br>(US\$/m) |
|---|-------------------------------|------------------------|
| A | 0.052                         | US\$1.66               |
| A | 0.071                         | US\$2.27               |
| A | 0.09                          | US\$2.88               |
| A | 0.106                         | US\$3.39               |

PEX & clamp method

| Commission rate<br>(Person/m) | Labor cost<br>(US\$/m) |
|-------------------------------|------------------------|
| 0.04                          | US\$1.28               |
| 0.05                          | US\$1.60               |
| 0.05                          | US\$1.60               |
| 0.06                          | US\$1.92               |

ライニング鋼管 (SGP-VA)  
 Table2

| Commission rate<br>(Person/m) | Labor cost<br>(US\$/m) |
|-------------------------------|------------------------|
| 0.089                         | US\$2.85               |
| 0.100                         | US\$3.20               |
| 0.123                         | US\$3.94               |
| 0.151                         | US\$4.83               |

Copper Pipe system (Listed)  
 brazing conection 100%  
 TS connection x 128%( Cal.

|     | Commission rate<br>(Person/m) | Labor cost<br>(US\$/m) |
|-----|-------------------------------|------------------------|
| 15A | 0.059                         | US\$1.89               |
| 20A | 0.082                         | US\$2.62               |
| 25A | 0.105                         | US\$3.36               |
| 32A | 0.129                         | US\$4.13               |

IPRESS system (Cal.) Table1  
 PEX & clamp method x70%

| Commission rate<br>(Person/m) | Labor cost<br>(US\$/m) | vs BM |
|-------------------------------|------------------------|-------|
| 0.028                         | US\$0.90               | 61%   |
| 0.035                         | US\$1.12               | 56%   |
| 0.035                         | US\$1.12               | 47%   |
| 0.042                         | US\$1.34               | 53%   |

PP-R Tube (Cal.) Table3  
 SGP connection x 75%

| Commission rate<br>(Person/m) | Labor cost<br>(US\$/m) | vs BM |
|-------------------------------|------------------------|-------|
| 0.067                         | US\$2.14               | 145%  |
| 0.075                         | US\$2.40               | 121%  |
| 0.092                         | US\$2.95               | 125%  |
| 0.113                         | US\$3.62               | 143%  |

\* ↑ \* Commission Rate : Number of person required for a connection of 1M pipe and fittings.



## 4 Estimation

Secondary[ per fitting type and items

### PEX- MECHFit

(A) Pex for Multilayer & InPress Fitting System

Price list in US\$

"InPress"



| Cat                  |    |           |             |          | Sheet (2) |  |
|----------------------|----|-----------|-------------|----------|-----------|--|
| US\$100 = 3.6608 AED |    |           |             |          |           |  |
| Size                 | m  | price/m   | Total(AED)  | price/US |           |  |
| 32mm                 | 1  | AED 12.84 | 12.84       | \$3.50   |           |  |
| 25mm                 | 22 | AED 7.71  | 169.54      | \$2.90   |           |  |
| 20mm                 | 85 | AED 5.14  | 436.70      | \$1.40   |           |  |
| 16mm                 | 0  | AED 3.67  | 0.00        | \$1.00   |           |  |
| InPress Fittings     |    |           |             |          |           |  |
| 20 Male Adapter      | 1  | AED 16.51 | 16.51       | \$4.50   |           |  |
| 32x25 B              | 1  | AED 66.79 | 66.79       | \$18.20  |           |  |
| 20T                  | 6  | AED 37.06 | 222.36      | \$10.10  |           |  |
| 25x20x25 T           | 3  | AED 46.61 | 139.82      | \$12.70  |           |  |
| 25x20x20 T           | 3  | AED 42.20 | 126.61      | \$11.50  |           |  |
| 25T                  | 1  | AED 52.11 | 52.11       | \$14.20  |           |  |
| 20L                  | 14 | AED 25.69 | 359.64      | \$7.00   |           |  |
| 20 Female Adapter    | 1  | AED 19.45 | 19.45       | \$5.30   |           |  |
| 20 Faucet L. w/stop  | 3  | AED 21.65 | 64.96       | \$5.90   |           |  |
| 20 Terminal L        | 9  | AED 20.18 | 181.66      | \$5.50   |           |  |
| 25 Male adapter      | 2  | AED 22.75 | 45.51       | \$6.20   |           |  |
| 20T                  | 4  | AED 37.06 | 148.26      | \$10.10  |           |  |
| 25x20x25 T           | 3  | AED 46.61 | 139.82      | \$12.70  |           |  |
| 25x20x20 T           | 1  | AED 42.20 | 42.20       | \$11.50  |           |  |
| 20L                  | 9  | AED 25.69 | 231.21      | \$7.00   |           |  |
| 20 Female Adapter    | 1  | AED 19.45 | 19.45       | \$5.30   |           |  |
| 20 Terminal L        | 7  | AED 20.18 | 141.29      | \$5.50   |           |  |
| 69                   |    |           | 1217.86     |          |           |  |
|                      |    |           | Total (AED) | 2,636.73 |           |  |

#### Materials

- ★ Pipe Length = Actual pipe length (per a roll supply)
- ★ Pipe price = COCOMECH List Price in US\$
- ★ InPress Fitting price = COCOMECH List Price in US\$
- ★ Terminal Elbow for Wash Machine, powder room and Kitchen
- ★ Male Adapter for Dish washer machine
- ★ Female adapter for Bathroom
- ★ Faucet Elbow with Base for Toilet

#### Labor fee calculation

- ★ Standard list at Table 1

| Size                 | m  | Labor (US\$) | Total (AED) |
|----------------------|----|--------------|-------------|
| 16                   | 0  | 0.00         | AED 0.00    |
| 20                   | 85 | 1.12         | AED 349.36  |
| 25                   | 22 | 1.12         | AED 90.42   |
| 32                   | 1  | 1.14         | AED 4.35    |
| Total Labor (in AED) |    |              | AED 438.79  |

### PPR

(B) PPR HEAT FUSION SYSTEM



| Cat                 |     |           |            |         | Sheet (2) |  |
|---------------------|-----|-----------|------------|---------|-----------|--|
| €1.00 = 5.2062 AED  |     |           |            |         |           |  |
| Size                | m   | price/m   | Total(AED) | price/€ |           |  |
| 32mm                | 1.1 | AED 22.20 | 24.42      | €4.29   |           |  |
| 25mm                | 28  | AED 13.64 | 381.88     | €7.56   |           |  |
| 20mm                | 94  | AED 8.14  | 763.22     | €1.54   |           |  |
| 16mm                | 0   | AED 6.61  | 0.00       | €1.25   |           |  |
| Subst PPR Fittings  |     |           |            |         |           |  |
| 20 Male Adapter     | 1   | AED 22.31 | 22.31      | €4.22   |           |  |
| 32x25 B             | 1   | AED 3.91  | 3.91       | €0.74   |           |  |
| 20T                 | 6   | AED 3.91  | 21.57      | €0.66   |           |  |
| 25x25x25 T          | 3   | AED 5.92  | 17.76      | €1.12   |           |  |
| 25x25x25 T          | 3   | AED 5.97  | 17.92      | €1.13   |           |  |
| 25T                 | 1   | AED 4.63  | 4.63       | €0.88   |           |  |
| 20 L                | 30  | AED 2.80  | 140.08     | €0.53   |           |  |
| 25 L                | 4   | AED 3.75  | 15.01      | €0.71   |           |  |
| 32 L                | 1   | AED 6.13  | 6.13       | €1.16   |           |  |
| 20 Female Adapter   | 1   | AED 19.61 | 19.61      | €3.71   |           |  |
| 20 Faucet L. w/stop | 3   | AED 21.25 | 63.75      | €4.02   |           |  |
| 20 Terminal L       | 9   | AED 20.14 | 181.26     | €3.81   |           |  |
| Added 20S           | 2   | AED 2.27  | 4.55       | €0.43   |           |  |
| Added 25S           | 2   | AED 2.59  | 5.18       | €0.49   |           |  |
| Added 25x25L        | 1   | AED 3.75  | 0.00       | €0.71   |           |  |
| 25 Male adapter     | 2   | AED 22.31 | 44.62      | €4.22   |           |  |
| 20T                 | 4   | AED 3.91  | 14.38      | €0.66   |           |  |
| 25x25x25 T          | 3   | AED 5.92  | 17.76      | €1.12   |           |  |
| 25x25x25 T          | 1   | AED 5.97  | 5.97       | €1.13   |           |  |
| 20L                 | 29  | AED 2.80  | 81.25      | €0.53   |           |  |
| 25L                 | 3   | AED 3.75  | 18.77      | €0.71   |           |  |
| 20 Female Adapter   | 1   | AED 19.61 | 19.61      | €3.71   |           |  |
| 20 Terminal L       | 7   | AED 20.14 | 140.98     | €3.81   |           |  |
| 139                 |     |           | 867.04     |         |           |  |

#### Materials

- ★ Pipe Length = Actual pipe length x 1.10 times (per 4m bar supply)
- ★ Pipe price = Spain List Price in EURO
- ★ PPR Fitting price = Spain List Price in EURO
- ★ Terminal Elbow for Wash Machine, powder room and Kitchen
- ★ Male Adapter for Dish washer machine
- ★ Female adapter for Bathroom
- ★ Faucet Elbow with Base for Toilet

#### Labor fee calculation

- ★ Standard list at Table 3

| Size              | m   | Labor (US\$) | Total (AED) |
|-------------------|-----|--------------|-------------|
| 16                | 0   | 2.14         | AED 0.00    |
| 20                | 94  | 2.40         | AED 827.91  |
| 25                | 28  | 2.95         | AED 383.33  |
| 32                | 1.1 | 3.62         | AED 14.63   |
| Total Labor (AED) |     |              | 1,151.24    |

# ⑦-6 Estimation

## @1 FLOOR SUM

D-1 Tower Estimation of Fitting & Pipe (ATTACH)

| Item                               | Size     | List Price (US\$/pc) | UNIT A    |      | UNIT B-1  |      | UNIT B-2  |      | UNIT C-1 |      | UNIT C-2 |      | UNIT |
|------------------------------------|----------|----------------------|-----------|------|-----------|------|-----------|------|----------|------|----------|------|------|
|                                    |          |                      | HOT       | COLD | HOT       | COLD | HOT       | COLD | HOT      | COLD | HOT      | COLD |      |
| Fixed Fitting Male                 | 16XR1/2  | 3.60                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XR1/2  | 4.50                 |           |      | 1         |      | 1         |      |          | 1    |          |      | 1    |
|                                    | 20XR3/4  | 6.70                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XR3/4  | 6.20                 | 2         |      |           |      |           |      |          |      |          |      | 2    |
|                                    | 25XR1    | 9.60                 |           |      |           |      | 2         |      | 2        |      |          |      |      |
| Equal and Reducing Union           | 32XR1    | 14.10                |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16       | 5.20                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20       | 6.60                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20X16    | 5.50                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25       | 9.10                 |           |      |           |      |           |      |          |      |          |      |      |
| Equal and Reducing Tee             | 25X16    | 10.70                |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25X20    | 7.50                 | 1         | 1    | 1         | 1    | 1         | 1    | 2        |      |          | 2    |      |
|                                    | 32       | 21.60                |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32X25    | 18.20                |           | 2    |           |      |           |      |          |      |          |      |      |
|                                    | 16       | 7.70                 |           |      |           |      |           |      |          |      |          |      |      |
| Equal and Reducing Tee             | 20       | 10.10                | 4         | 4    | 4         | 3    | 4         | 3    | 4        | 3    | 4        | 3    | 2    |
|                                    | 20X16X20 | 9.30                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20X16X16 | 8.60                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20X20X   |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25       |                      |           |      |           |      |           |      |          |      |          |      |      |
| Elbow                              | 25X16X   |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25X20X   |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25X20X   |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32X20X   |                      |           |      |           |      |           |      |          |      |          |      |      |
| Fixed Fitting Female               | 32X25X   |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32X25X   |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20 (PPR) |                      |           |      |           |      |           |      |          |      |          |      |      |
| Elbow with Short Flange Base       | 25 (PPR) |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32 (PPR) |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
| Terminal Elbow Female End          | 20XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG     |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32XG     |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
| Terminal Elbow Male End            | 20XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG     |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32XG     |                      |           |      |           |      |           |      |          |      |          |      |      |
| Tee with Female End                | 16XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG     |                      |           |      |           |      |           |      |          |      |          |      |      |
| Manifold Barbi                     | 32XG     |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XG1    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25XG3    |                      |           |      |           |      |           |      |          |      |          |      |      |
| Shut Off Valve (pomo)              | 25       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20       |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20       |                      |           |      |           |      |           |      |          |      |          |      |      |
| Multilayer Pipe (m)                | 25       | 35.00                |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20       | 30.50                |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 25       | 34.80                |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16 x 2.0 | 1.50                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20 x 2.0 | 1.50                 |           |      |           |      |           |      |          |      |          |      |      |
| PEX Pipe (m)                       | 25 x 2.5 | 4.00                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 32 x 3.0 | 6.40                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 16 x 2.0 | 1.00                 |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 20 x 2.0 | 1.40                 | 37        | 52   | 43        | 64   | 43        | 64   | 31       | 31   | 31       | 31   | 14   |
|                                    | 25 x 2.5 | 2.10                 | 12.5      | 14   | 10        | 9    | 10        | 9    | 5        | 10   | 5        | 10   | 5    |
| TOTAL for FITTING (pcs)            | 32 x 3.0 | 3.50                 |           | 4.3  | 54        | 5    | 54        | 5    | 9.8      | 9.8  | 9.8      | 9.8  |      |
|                                    | 50m      | 64                   |           | 102  |           | 101  |           | 39   | 57       | 39   | 57       | 25   |      |
|                                    | 70m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 58m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 78m      |                      |           |      |           |      |           |      |          |      |          |      |      |
| Total cost Comparison (1 XPR : PP) | 50m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 70m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 58m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 78m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 58m      |                      |           |      |           |      |           |      |          |      |          |      |      |
| Total cost Comparison (1 XPR : PP) | 78m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 36m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 42m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 36m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    | 42m      |                      |           |      |           |      |           |      |          |      |          |      |      |
| Total cost Comparison (1 XPR : PP) | 13m      |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    |          |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    |          |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    |          |                      |           |      |           |      |           |      |          |      |          |      |      |
|                                    |          |                      |           |      |           |      |           |      |          |      |          |      |      |
| Total cost Comparison (1 XPR : PP) |          |                      | 1 : 0.50S |      | 1 : 1.01S |      | 1 : 1.06S |      |          |      |          |      |      |

### 山内様

D1 Tower 給水給湯向け EXPRESS御照会の件  
下記のとおり御見積もり申し上げます。(PEX版)

|         |                |
|---------|----------------|
| 受 発 期 日 | 別添打合せ          |
| 受 発 場 所 | Dubai CY / CFS |
| 取 引 条 件 | 別添打合せ          |
| 有 効 期 限 | 21 年 12 月 23 日 |
| 通 算 他   | 別添打合せ          |

合計金額 US\$3,530.40

| 品 番 記 号  | 品 名 仕 様                         | 数 量    | 単 価 | 金 額 |
|----------|---------------------------------|--------|-----|-----|
| 290-0005 | PEX pipe Φ20 (@120m)            | 7      |     |     |
| 290-0006 | PEX pipe Φ25 (@50m)             | 5      |     |     |
| 290-0008 | PEX pipe Φ32 (@50m)             | 3      |     |     |
| 233-0804 | Fixed fitting Male 20 x 1/2     | 10     |     |     |
| 233-1008 | Fixed fitting Male 25 x 3/4     | 16     |     |     |
| 253-1210 | Fixed fitting Male 32 x 1       | 22     |     |     |
| 232-1006 | Reduced Union 25x20             | 13     |     |     |
| 232-1210 | Reduced Union 32x25             | 5      |     |     |
| 231-0006 | Tee 20                          | 87     |     |     |
| 231-0010 | Tee 25                          | 8      |     |     |
| 231-1910 | Reduced Tee 25x20x25            | 29     |     |     |
| 231-1906 | Reduced Tee 25x20x20            | 29     |     |     |
| 251-0012 | Tee 32                          | 1      |     |     |
| 251-2006 | Reduced Tee 32x20x32            | 5      |     |     |
| 251-2007 | Reduced Tee 32x25x25            | 7      |     |     |
| 251-2009 | Reduced Tee 32x25x32            | 2      |     |     |
| 230-0006 | Elbow 20                        | 203    |     |     |
| 230-0010 | Elbow 25                        | 10     |     |     |
| 250-0012 | Elbow 32                        | 1      |     |     |
| 234-0804 | Fixed Fitting Female 20 x 1/2   | 16     |     |     |
| 234-1006 | Fixed Fitting Female 25 x 3/4   | 1      |     |     |
| 237-0804 | Terminal Elbow 20 x 1/2         | 138    |     |     |
| 235-0804 | Elbow with fixing base 20 x 1/2 | 28     |     |     |
|          |                                 | 629 pc |     |     |

### 納期 備考

- ・正式注文を頂き、受注確認書を受領後約3-4週間後 Dubai CY着
- ・DPPRESS定価表 x45%(fitting) x50%(pipe)にて見積もりしています。
- ・実際は1カートン or 1巻mにあわせて最小ロット単位にての請求書となります。
- ・引き取り条件は「CFS Dubai」といたします
- ・D1タワー低層階ワンフロア全体の見積もりです。詳細は資料をご覧ください。
- ・Brass品の在庫とPSU品が異なるためでの出荷をご了承ください。価格はPSU版に合わせます。

NO.NKC-091107M

平成21年11月7日

東尾メック株式会社

本社工場 河内長野市蜀水町8-22 〒586-0012

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Page 1 of 1



# Qatar “Traders Hotel & Apartment”

Doha, Qatar

32 stories Hotel and Residential tower building  
(Approx. 13,000 fittings and 26,000m PEX pipes)



- Clients : Shanglira Hotel Group & Sheik Faisal Bin Al Thani
- Consultants : DIWAN
- Main Contractor : Al Habtoor Engineering
- MEP Contractor : Target Rotary

PEX pipe (20–32mm) were used for both horizontal and vertical piping line for hot and cold water supply.













# • Qatar National Convention Center Extension Project (in Education City, Doha)

(Approx. 13,000 fittings and 26,000m PEX pipes)



- Clients : Qater Foundation
- Consultants : QP-Special Project, KEO International
- Main Contractor : Midmac – Sixt Construct
- MEP Contractor : Midmac





# Dubai “Pentominium Tower”

Dubai, U.A.E.

240 Units residential tower





# Singapore “Marina Bay Sands”

3,000 Units Hotel

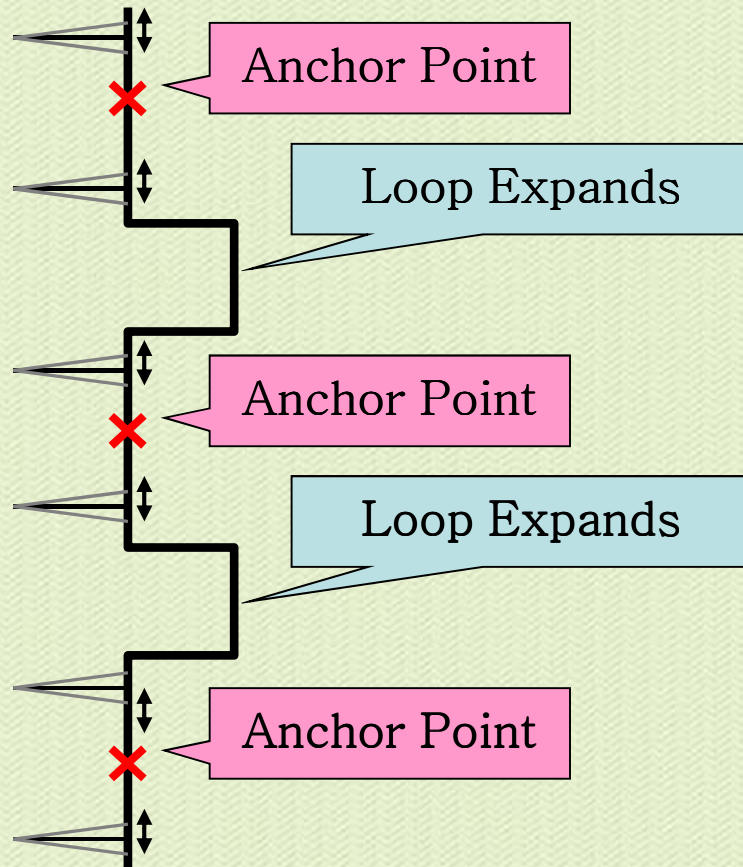


Valuation  
“Cost & Quality”

## MARINA BAY SANDS IR – HOTEL PACKAGE

### New Proposal of Piping System for the Solution against Deformation

#### i) Initial Idea as at Tender Stage



**Anchor Points to be provided at Suitable Floors  
(Mount on the Floor – Standard Method)**

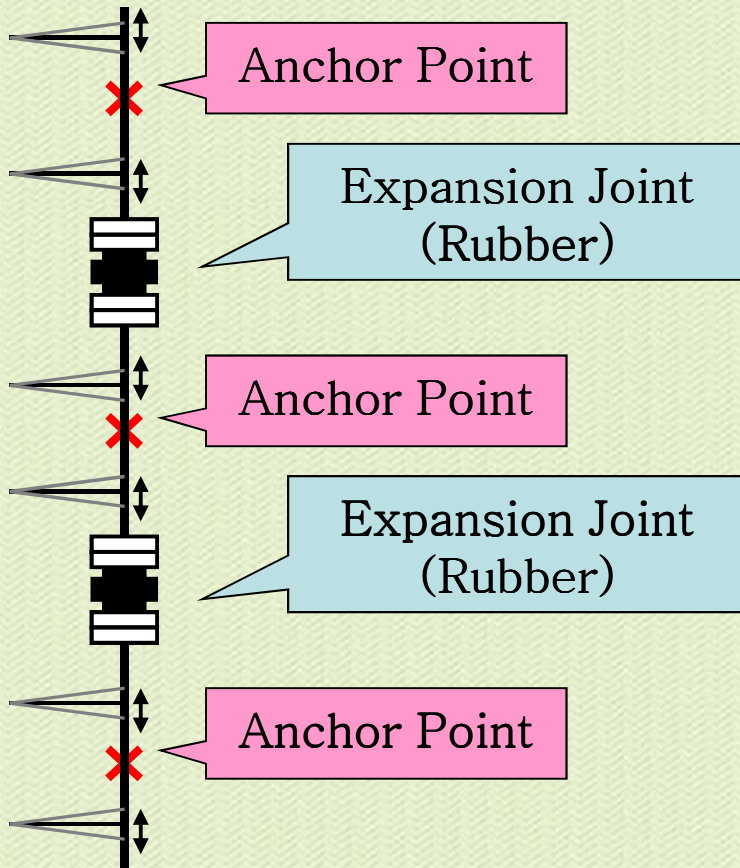
**Loop Expands to be provided between Anchor Points to absorb pipe expansion / contraction & Building Deformation**



## MARINA BAY SANDS IR – HOTEL PACKAGE

### New Proposal of Piping System for the Solution against Deformation

#### ii) Idea as at Design Development (Previous Idea)



Anchor Points to be provided at Suitable Floors **(Mounted on the side of concrete slab)**

**Expansion Joints** shall be provided between Anchor Points to absorb pipe expansion / Contraction & Building Deformation

**\*\*Found that Loop Expands cannot be installed due to congested space in the shaft.**



**It causes much frequent maintenance by Owner & higher potential of leakage in future.**



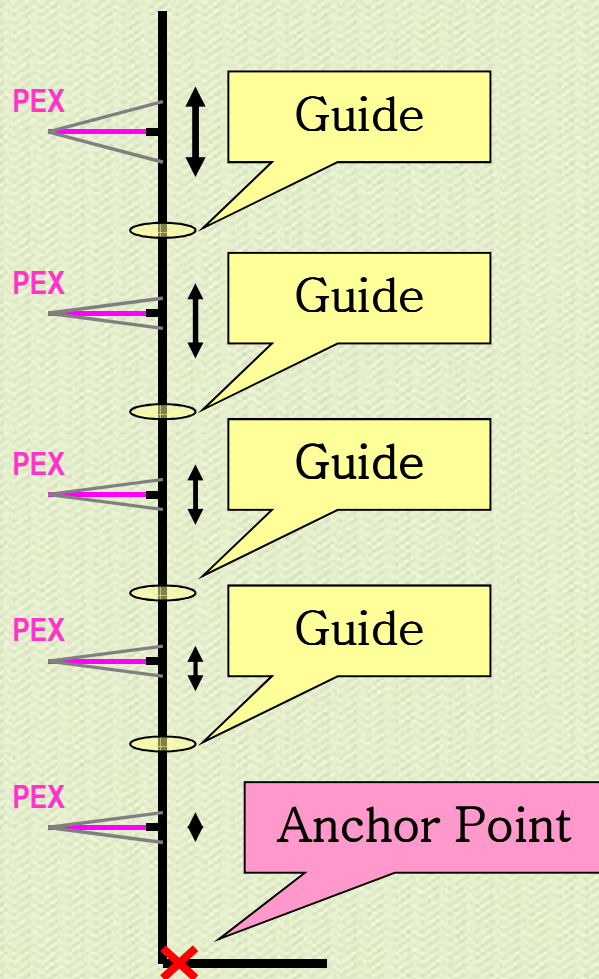


## MARINA BAY SANDS IR – HOTEL PACKAGE

### New Proposal of Piping System for the Solution against Deformation



#### iii) New Proposed Solution “ixPress” (MechFi



Anchor Points to be provided **at Bottom of Riser Pipe only** unless the load at bottom exceed 21kN.

Pipe will move by its expansion/contraction, & relatively moved by Building deformation.

Differential of Movement gets larger and larger with the distance from the anchor point being further.

To use ML tube (3 layer cross-linked polyethylene pipe), which has well-pliedity and flexibility.



It enables to minimize number of expansion joints and elbow fitting at branch pipe, which results higher reliability.

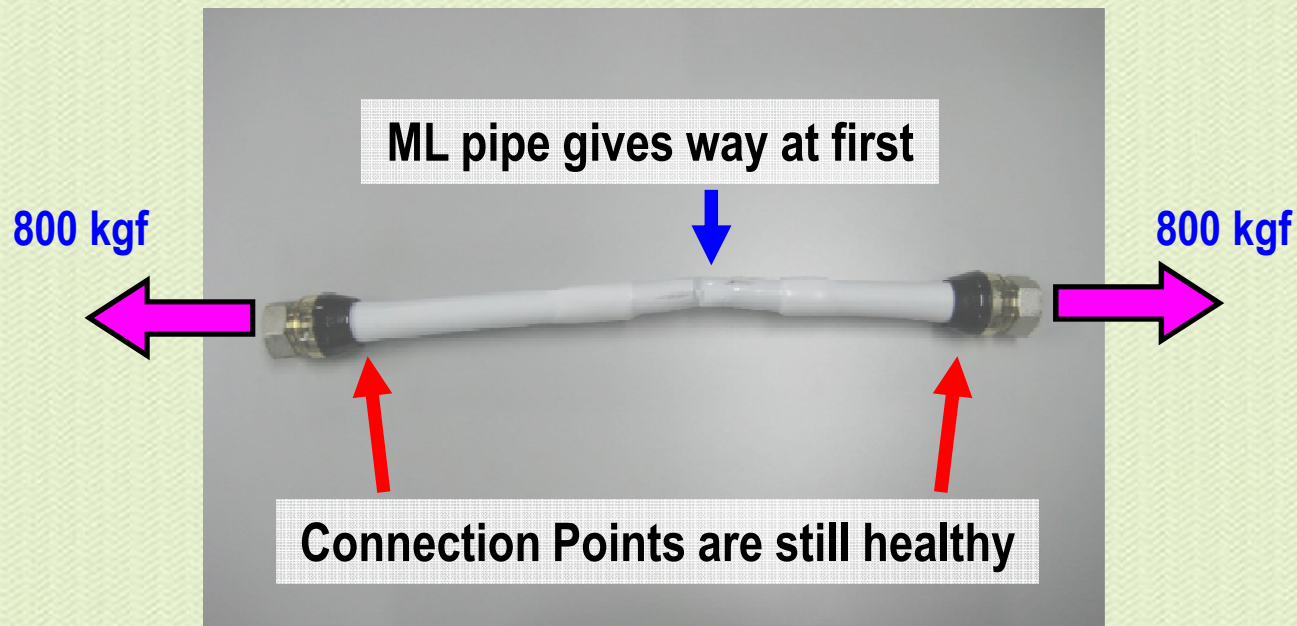


## New Proposal of Piping System for the Solution against Deformation

Really doesn't ML Pipe come out from Fitting ?

**No.**

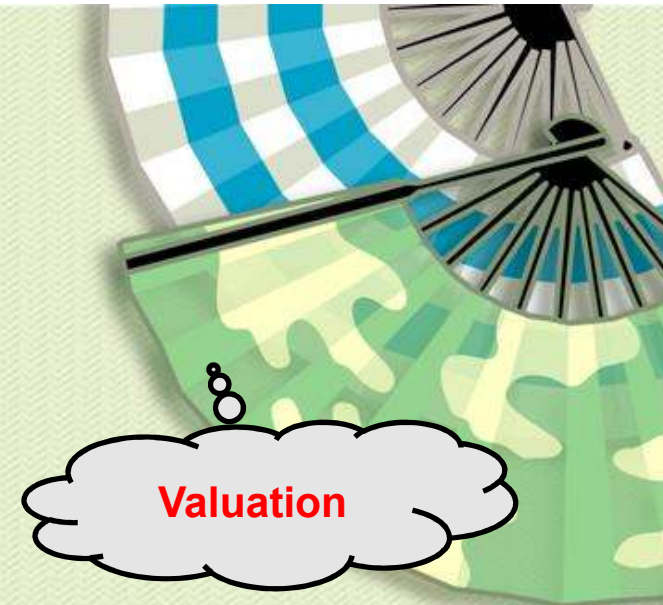
Once the Fitting is fixed properly, the pipe will not come out forever.





# Singapore “Hundred Tree Condominium” “Volari Condominium”

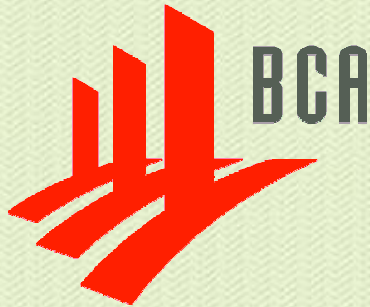
400 Units condominium  
80 Units condominium





Also, you can embrace...

BCA productivity point / SGBC tax refund point program by ratifying our system





# Indonesia “NIPRO Factory”

Medical Equipment production factory

## Project Perspective





# China “Tianjin Eco-City”

Joint Venture Project of  
Singapore Tianjin Eco-City Investment Holdings Pte. Ltd. (STEC)  
and  
Tianjin Eco-City Investment & Development Co., Ltd. (TECID)



Valuation:  
“Green”



Total Area: 34.2sqkm

40km east to Tianjin downtown



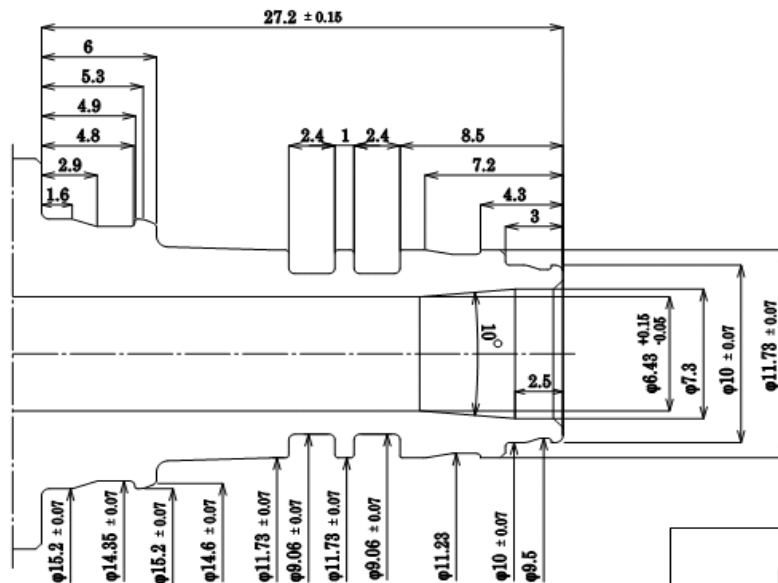
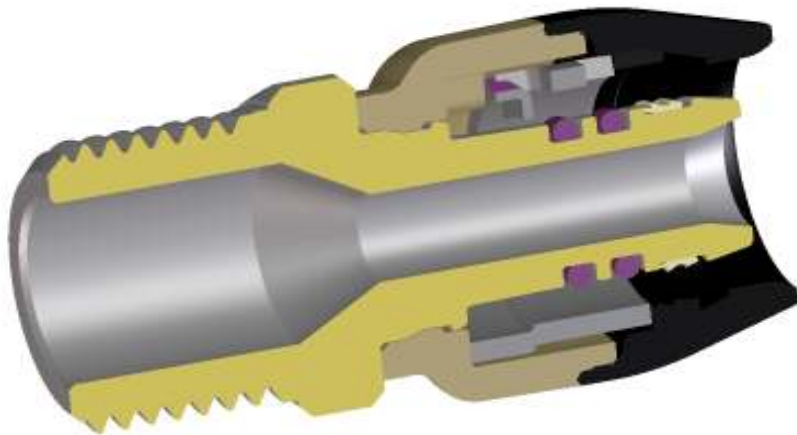
# Loading Unit





# Internal Diameter “Mech Fit”

“MECHFit” is designed with EN standard



16

## EN1254-3 standard

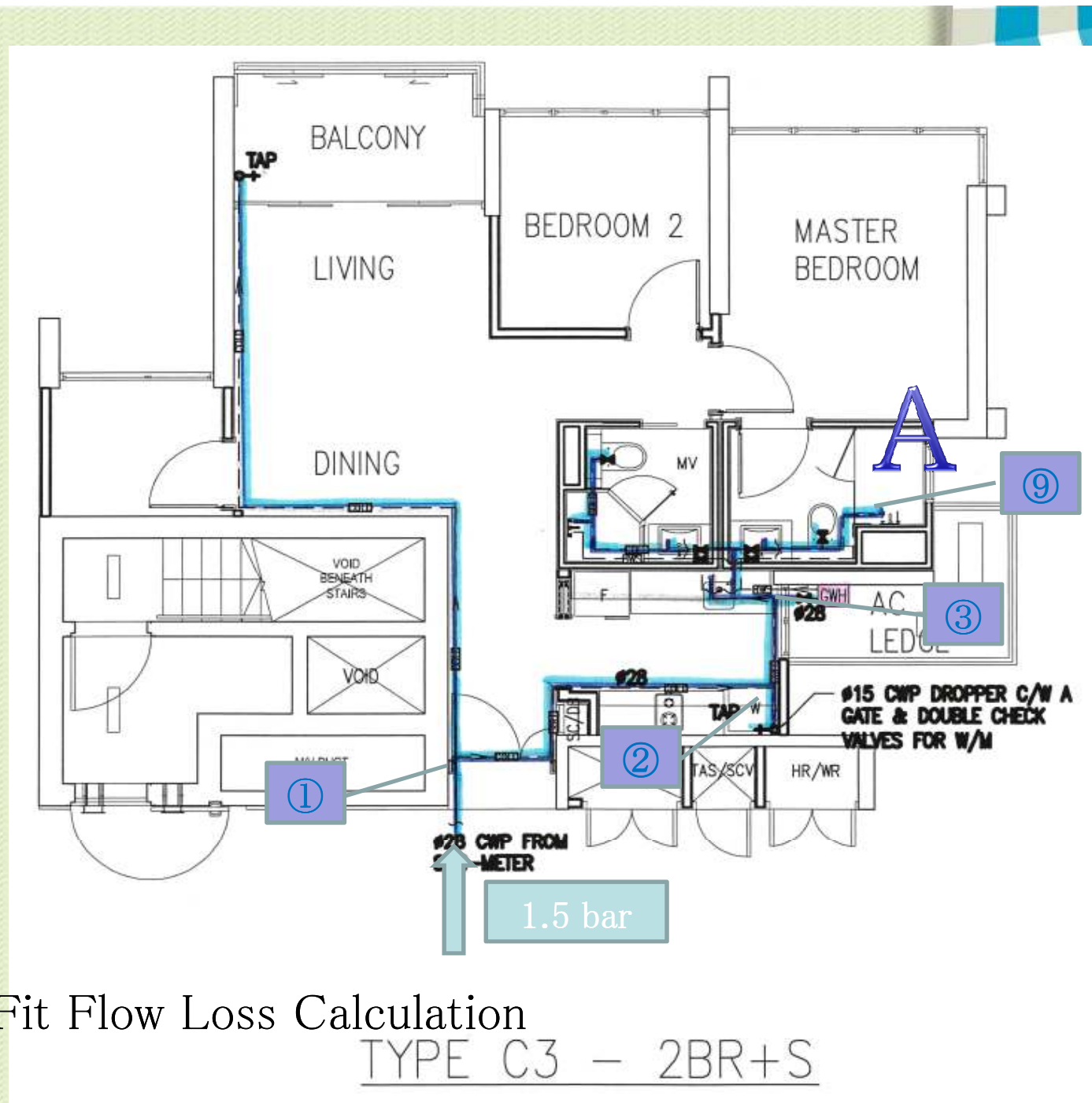
### 4.3.2 Min. Cross Section area of bores

D16 Bore > 30% / actual 30.3%  
=relationship of bore to theoretical min of bore of pipe

### 4.3.3. Table Min. wall thickness

D16 mm > 1.2 / actual 1.205





MechFit Flow Loss Calculation

TYPE C3 - 2BR+S



# Flow 12L/min. is confirmed

## How do you believe it?



Table -2 Pipe sizing tabulation chart

Initial Head Loss available at the sub-mater = 1.5bar => 15m

| 1              | 2            | 3                      | 4                         | 5              | 6                   | 7               | 8                    | 9                   | 10                                   | 11                 | 12            | 13                                | 14                       |
|----------------|--------------|------------------------|---------------------------|----------------|---------------------|-----------------|----------------------|---------------------|--------------------------------------|--------------------|---------------|-----------------------------------|--------------------------|
| Pipe Reference | Loading Unit | Design Flow rate (l/s) | Assume tube Diameter (mm) | Velocity (m/s) | Head Loss (mm/aqua) | Pipe Length (m) |                      | Total Head Loss (m) | Vertical drop (+) or rise (-) in (m) | Available Head (m) | Residual Head | Residual Head required at Fitting | Final Tube diameter (mm) |
|                |              |                        |                           |                |                     | Actual (pipe)   | Effective (fittings) |                     |                                      |                    |               |                                   |                          |
| 1-2            | 22.0         | 0.47                   | 20                        | 2.5            | 424.89              | 7.00            | 2.00                 | 3.82                | -2.5                                 | 15                 | 8.68          |                                   | 20                       |
| 2-4            | 16.0         | 0.40                   | 20                        | 2              | 283.22              | 1.00            | 2.00                 | 0.85                | 0                                    | 8.68               | 7.83          |                                   | 20                       |
| 4-5            | 13.0         | 0.35                   | 20                        | 1.8            | 234.14              | 1.00            | 4.90                 | 1.38                | 0                                    | 7.83               | 6.44          |                                   | 20                       |
| 5-8            | 6.5          | 0.20                   | 16                        | 1.8            | 337.08              | 1.00            | 6.60                 | 2.56                | 0                                    | 6.44               | 3.88          |                                   | 16                       |
| 8-9            | 5.0          | 0.16                   | 16                        | 1.4            | 215.17              | 1.00            | 2.40                 | 0.73                | 2.5                                  | 3.88               | 5.65          |                                   | 16                       |
| 9-A            | 3.0          | 0.11                   | 16                        | 1              | 118.79              | 3.00            | 6.30                 | 1.10                | -1                                   | 5.65               | 3.55          |                                   | 16                       |

Equivalent Pipe Length for MechFit Body

unit: m

| Niminal Dia | Adapter |        | Socket | Elbow | Terminal L | Tee      |        |
|-------------|---------|--------|--------|-------|------------|----------|--------|
|             | Male    | Female |        |       |            | Straight | Branch |
| 16          | 3.3     | 1.6    | 2.6    | 6.6   | 6.3        | 1.2      | 10.0   |
| 20          | 3.2     | 2.0    | 3.4    | 5.4   | 3.2        | 1.0      | 4.9    |
| 25          | 1.9     | 2.0    | 3.9    | NA    | NA         | NA       | NA     |



# Hydrological parameter

☘ Sometime the result is inconsistent.

- ① Actual labo test (tomorrow) : 12L/min.
- ② Actual comparison test for PPr (tomorrow)
- ③ Actual pressure loss per a fitting : data.  
⇒ converted to equivalent pipe length

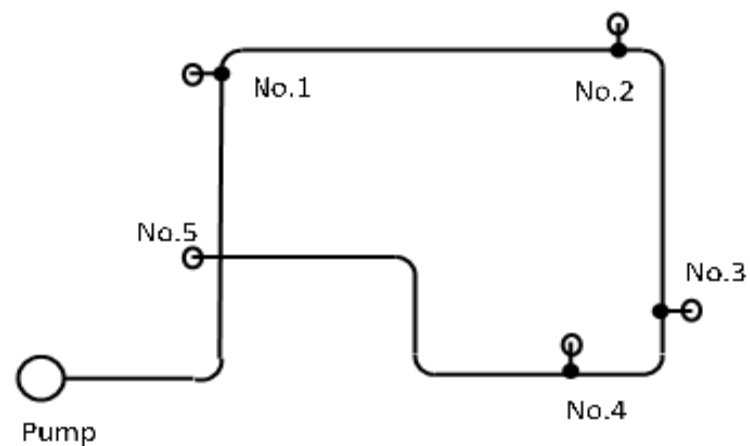
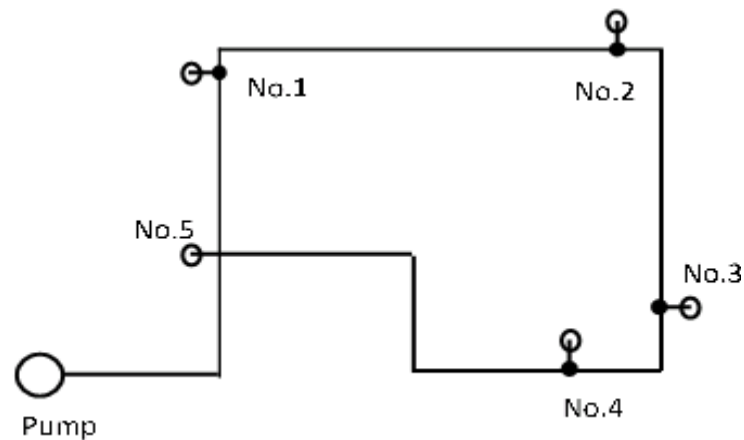
• So that the accumulate results goes our data more consistent direction.



| Water Flow Test Nb2 ( Double ) |                |             |            |                   |             |
|--------------------------------|----------------|-------------|------------|-------------------|-------------|
|                                | Pressure (Mpa) | Location No | e quipment | measure time(sec) | Flow(ℓ/min) |
| PP-r                           | 0.2            | Nb2         | Kitchen    |                   | #DIV/0!     |
|                                |                |             | Kitchen    |                   | #DIV/0!     |
|                                |                |             | Kitchen    |                   |             |
|                                |                |             | average    |                   |             |
|                                |                | Nb5         | Bath       |                   |             |
|                                |                |             | Bath       |                   |             |
|                                |                |             | Bath       |                   |             |
|                                |                |             | average    |                   |             |



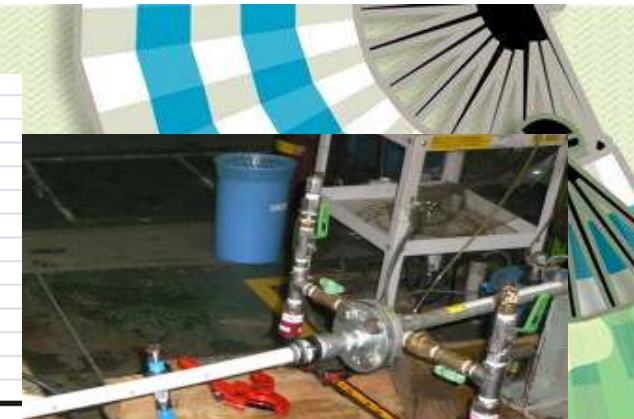
| Water Flow Test Nb2 ( Double ) |                |             |            |                   |             |
|--------------------------------|----------------|-------------|------------|-------------------|-------------|
|                                | Pressure (Mpa) | Location No | e quipment | measure time(sec) | Flow(ℓ/min) |
| MechFit                        | 0.2            | Nb2         | Kitchen    | 20                | 18.00       |
|                                |                |             | Kitchen    | 20                | 18.00       |
|                                |                |             | Kitchen    | 20                | 18.00       |
|                                |                |             | average    |                   | 18.00       |
|                                |                | Nb5         | Bath       | 21                | 17.14       |
|                                |                |             | Bath       | 21                | 17.14       |
|                                |                |             | Bath       | 20                | 18.00       |
|                                |                |             | average    |                   | 17.43       |





| 流速<br>(m) | 圧力損失<br>kPa/m |
|-----------|---------------|
| 0.4       | 0.2449        |
| 0.6       | 0.489         |
| 0.8       | 0.804         |
| 1         | 1.187         |
| 1.2       | 1.637         |
| 1.4       | 2.151         |
| 1.6       | 2.729         |
| 1.8       | 3.371         |
| 2.0       | 4.074         |
| 2.5       | 6.102         |
| 3         | 8.512         |

| 流速<br>(m) | 圧力損失<br>kPa/m |
|-----------|---------------|
| 0.4       | 0.167         |
| 0.6       | 0.336         |
| 0.8       | 0.554         |
| 1         | 0.82          |
| 1.2       | 1.133         |
| 1.4       | 1.491         |
| 1.6       | 1.894         |
| 1.8       | 2.341         |
| 2         | 2.832         |
| 2.5       | 4.2488        |
| 3         | 5.933         |



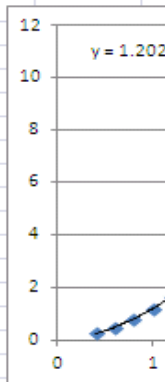
16mm  $Y=1.2025 \times 1.7888$

20mm  $Y=0.8299 \times 1.7788$

2012年3月8日 測定

| 試料継手       | 管長さ    |        | 流速<br>(m) | 測定値<br>全体差圧 | 1m当たり管の損失   |             | 他の継手の損失      |              | 1個の試料継手の損失<br>kPa | 試験継手の相当管長さ |      |
|------------|--------|--------|-----------|-------------|-------------|-------------|--------------|--------------|-------------------|------------|------|
|            | (20mm) | (16mm) |           | kPa         | 20mm<br>kPa | 16mm<br>kPa | MAD<br>相当管長さ | MAD<br>相当管長さ |                   | (m)        | 計算値  |
| 20X3/4MAD  | 2.00   |        | 1.24      | 9.17        | 1.2167581   |             |              |              | 3.368             | 2.768      | 3.23 |
|            | 2.00   |        | 1.16      | 9.24        | 1.0806465   |             |              |              | 3.539             | 3.275      |      |
|            | 2.00   |        | 1.16      | 9.10        | 1.0806465   |             |              |              | 3.469             | 3.210      |      |
|            | 2.00   |        | 1.16      | 9.17        | 1.0806465   |             |              |              | 3.504             | 3.243      |      |
|            | 2.00   |        | 1.16      | 9.17        | 1.0806465   |             |              |              | 3.504             | 3.243      |      |
| 20X3/4 MAD | 0.70   |        | 1.33      | 7.21        | 1.3782661   |             |              |              | 3.123             | 2.266      |      |
|            | 0.70   |        | 1.24      | 7.07        | 1.2167581   |             |              |              | 3.109             | 2.555      |      |
|            | 0.70   |        | 1.33      | 7.35        | 1.3782661   |             |              |              | 3.193             | 2.316      |      |
|            | 0.70   |        | 1.33      | 7.35        | 1.3782661   |             |              |              | 3.193             | 2.316      |      |
|            | 0.70   |        | 1.33      | 7.00        | 1.3782661   |             |              |              | 3.018             | 2.189      |      |
| 16X1/2MAD  |        | 2.00   | 2.06      | 41.09       |             | 4.3177096   |              |              | 16.227            | 3.758      | 3.29 |
|            |        | 2.00   | 2.36      | 41.58       |             | 5.4915107   |              |              | 15.298            | 2.786      |      |
|            |        | 2.00   | 2.36      | 42.00       |             | 5.4915107   |              |              | 15.508            | 2.824      |      |
|            |        | 2.00   | 2.21      | 42.00       |             | 4.8892938   |              |              | 16.111            | 3.295      |      |
|            |        | 2.00   | 2.06      | 42.07       |             | 4.3177096   |              |              | 16.717            | 3.872      |      |

| 試料継手   | 管長さ    |        | 流速<br>(m) | 測定値<br>全体差圧 | 1m当たり管の損失   |             | 他の継手の損失      |              | 継手の総損失<br>kPa | 試験継手の相当管長さ |      |
|--------|--------|--------|-----------|-------------|-------------|-------------|--------------|--------------|---------------|------------|------|
|        | (20mm) | (16mm) |           | kPa         | 20mm<br>kPa | 16mm<br>kPa | MAD<br>相当管長さ | MAD<br>相当管長さ |               | (m)        | 計算値  |
| 20T 通し | 2.00   |        | 1.24      | 10.64       | 1.2167581   |             | 3.23         | 3.23         | 8.206         | 0.285      | 0.95 |
|        | 2.00   |        | 1.24      | 10.50       | 1.2167581   |             | 3.23         | 3.23         | 8.066         | 0.169      |      |
|        | 2.00   |        | 1.16      | 10.57       | 1.0806465   |             | 3.23         | 3.23         | 8.409         | 1.321      |      |
|        | 2.00   |        | 1.08      | 10.36       | 0.9516559   |             | 3.23         | 3.23         | 8.457         | 2.426      |      |
|        | 2.00   |        | 1.16      | 10.50       | 1.0806465   |             | 3.23         | 3.23         | 8.339         | 1.256      |      |
| 20T 枝  | 1.90   |        | 1.33      | 16.52       | 1.3782661   |             | 3.23         | 3.23         | 13.901        | 3.626      | 4.93 |
|        | 1.90   |        | 1.24      | 15.89       | 1.2167581   |             | 3.23         | 3.23         | 13.578        | 4.699      |      |
|        | 1.90   |        | 1.33      | 15.68       | 1.3782661   |             | 3.23         | 3.23         | 13.061        | 3.017      |      |
|        | 1.90   |        | 1.16      | 16.03       | 1.0806465   |             | 3.23         | 3.23         | 13.977        | 6.474      |      |
|        | 1.90   |        | 1.08      | 16.10       | 0.9516559   |             | 3.23         | 3.23         | 14.292        | 8.558      |      |





Initial Head Loss available at the sub-mater = 1.5bar => 15m

[illegible]



# Conclusion

PEX and Multilayer Pipe's Quality Performance will Best Regulate the Environmental Issues in the Piping System.

MECHFit brings you a non-error system with a rate of less than 1.0 ppm of reject.

**MECHFit assemble facility**



**Automatic Assembly Machine designed  
and manufactured by HIGASHIO.**